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STUDIES IN RUBUS

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ARTICLE 3.
CHROMOSOME STUDIES IN RUBUS.[1]

By John Einset, New York State Agricultural Experiment Station, Geneva, N. Y.

In the spring of 1944 a study of chromosome number, morphology and behavior in a number of Rubus species was undertaken in cooperation with L. H. Bailey of the Bailey Hortorium of the New York State College of Agriculture at Cornell University, Ithaca. The present paper is a preliminary report designed to outline the methods and to present the findings to date. The data are in many cases fragmentary, but indicate many lines for further investigation in this complex and variable group of plants.

Material and methods

Determinations of chromosome number in the root-tips, and studies of chromosome behavior at meiosis, were made in the same plants. Specimens from these plants for the herbarium of the Bailey Hortorium were collected by L. H. Bailey who made the specific determinations.

Flower-buds were collected from plants growing in the field in the spring of 1945 for studies of meiotic behavior of the chromosomes. These plants were marked and herbarium specimens collected when the plants had reached the proper stage of development. The plants were then dug, potted and grown in the greenhouses of the New York State Agricultural Experiment Station at Geneva. Root-tips were taken from these plants for studies of chromosome numbers and morphology.

Meiotic chromosome behavior was studied in aceto-carmine smear preparations. The flower-buds were fixed in 2 parts of absolute alcohol to 1 part of acetic acid and stored at 35-40° F until the preparations were made. Material stored for several days to two or three months still gave usable preparations. Some difficulty was experienced in obtaining a good stain in the chromosomes with a clear colorless cytoplasm. Best results were obtained when a saturated solution of carmine in 45% acetic acid was diluted with an equal volume of 50% acetic acid. Steel needles, which added the necessary iron, were used in the dissection. The size of the flower-buds at the time of meiosis varied somewhat from species to species, but in most species the proper stage was present in buds measuring 2–3 mm. in diameter at the base. Such buds ordinarily contained anthers in various stages of

[1] Journal Paper No. 654, N. Y. State Agr. Exp. Sta., Geneva, N. Y., Dec. 26, 1945.

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meiosis, those in the earlier stages being smaller and white in color, while those containing spores or pollen were larger and cream-colored after fixation. A binocular microscope magnifying 10 to 20 diameters was useful in dissecting the buds.

Somatic chromosome counts were made in root-tips taken from the potted plants. The fixations were made in CRAF (Randolph 1935). The roots were mounted on cards according to the method of Randolph (1940) and stained with Crystal Violet. Slides were also prepared, stained in Iron-alum Haematoxylin, a more permanent stain than Crystal Violet. These slides are at the Bailey Hortorium.

The drawings were made with the aid of a camera lucida, using a 90x objective and a 25x ocular.

Chromosomes of Rubus

The plants studied were members of the subgenus Eubatus, the true blackberries, with the exception of *R. strigosus* of the subgenus Idæobatus, the raspberries.

In Table I, the species in which determinations of chromosome number were made are grouped according to sections in the subgenus Eubatus. Only a few plants were examined of any one species and in many cases determinations of chromosome number were made in only one plant. The possibility, therefore, exists that the chromosome number recorded may not be the typical number for the species.

In making the root-tip chromosome counts, from five to ten or more roots of each plant were examined. No variation in chromosome number was found in roots from the same plant. Neither were any sectors with the doubled chromosome number observed in any of the roots. The determinations of chromosome number as made in the root-tips agreed in all cases with the numbers determined in the microsporocytes, as far as definite determinations could be made in sporocyte smear preparations.

The herbarium sheets prepared from the plants examined are preserved as are also the microscope slides. The number of plants collected in which chromosome numbers have been determined is indicated in Table I.

Chromosome numbers

Somatic chromosome numbers may be of use in evaluating taxonomic units founded on field observation. The chromosomes of the species of Rubus under investigation fall into a regular series of multiples of the basic number 7. The somatic chromosome numbers ranged from 14 through 63 in the species studied (Table I). All the species, with the exception of *Rubus Wiegandii*, which had 36 chromosomes (Fig. 56, number 10), were euploids with exact multiples of the base number 7.

A surprisingly large number of species were triploid with a somatic

TABLE I. SOMATIC CHROMOSOME NUMBERS IN RUBUS.

Species	Chromosome number	Number of plants examined
Hispidi		
signatus	21	1
plus	21	1
Huttonii	28	1
Setosi		
dissensus	21	3
Boottianus	14	1
jejunus	28	1
Flagellares		
flagellaris	63	2
minnesotanus	35	1
noveboracus	35	1
meracus	49	1
plicatifolius	63	3
Cuneifolii		
serissimus	28	2
Canadenses		
canadensis	21	2
Alleghenienses		
allegheniensis*	14	2
pugnax*	14	1
Rosa	21	1
Arguti		
abactus	35	2
bellobatus	21	1
"	28	2
avipes*	21	2
localis	21	1
Hanesii	28	3
uniquus	28	1
Cardianus	35	3
Wiegandii	36	1
pensilvanicus	28	2
Idæobatus		
strigosus	21	3

* In case of *R. pugnax* determinations were made in sporocytes only. In *R. allegheniensis* and *R. avipes* from sporocytes in one plant, root in another.

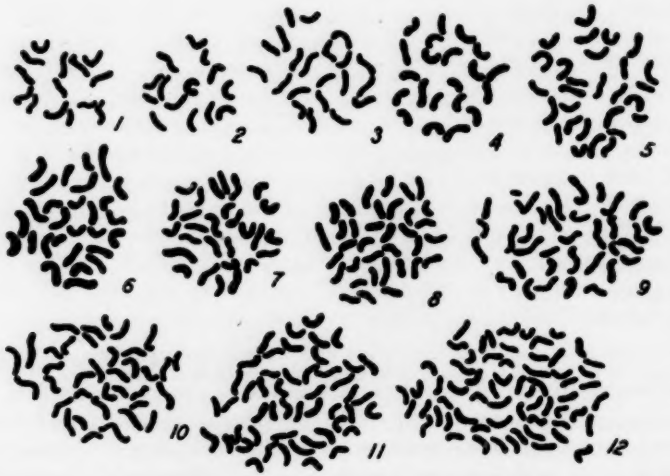
chromosome number of 21 (Fig. 56, 3 and 4) as determined from root-tip counts. Tetraploid 28-chromosome plants (Fig. 56, 5, 6, and 7) were next most frequent in occurrence, followed by the 35 chromosome forms (Fig. 56, 8 and 9). Forms with 14 (Fig. 56, 1 and 2), 49 (number 11) and 63 chromosomes (number 12) occurred infrequently in the material examined.

Plants of *R. bellobatus* collected from two different localities near Ithaca (Table I) had chromosome numbers of 21 and 28.

Morphology of the chromosomes

In certain plant genera the chromosomes are well differentiated morphologically and the visible morphology has been used in the study of relationships. In most of these cases the chromosomes are relatively large and few in number. In forms with very small or very numerous chromosomes it is often difficult or impossible to use the morphology of the chromosomes in the study of relationships. The detailed morphology of the chromosomes of Rubus was not worked out. The chromosomes are small, ranging in length from about 1 to 3 or 4 micra. Also, the CRAF fixing fluid tends to swell the chromosomes somewhat and is well adapted to the making of chromosome counts but is not well suited for studies of chromosome morphology in plants with small chromosomes.

No significant size differences were noted between the chromosome sets of different species (Fig. 56). The variation in chromosome size between species was no more marked than the differences between plants of the same species, different roots of the same plant or between cells in the same root. Some of these slight differences were undoubtedly due to variability in fixation, intensity of stain and conditioned by the exact stage of mitotic metaphase.



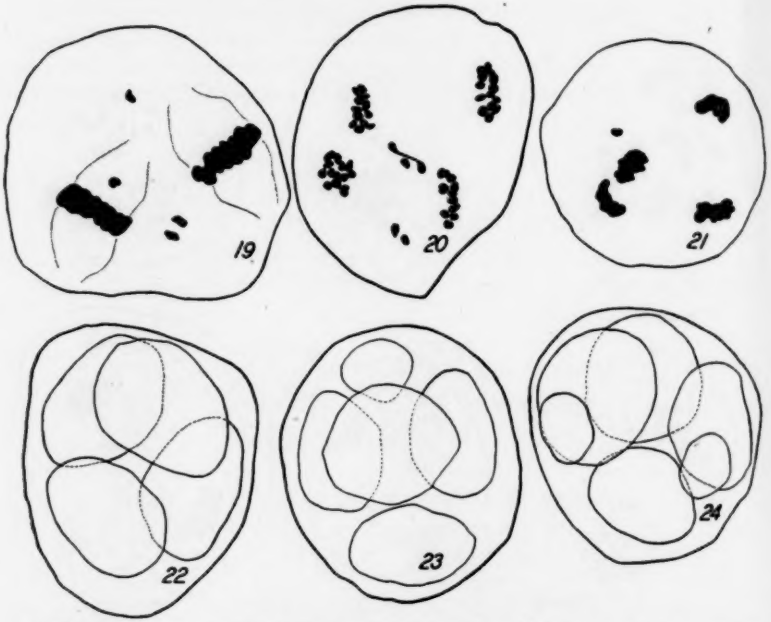
56. POLAR VIEWS OF MITOTIC METAPHASES, magnification about × 2200. 1, *R. alleghaniensis*, 2n = 14; 2, *R. Boottianus*, 2n = 14; 3, *R. canadensis*, 2n = 21; 4, *R. Rosa*, 2n = 21; 5, *R. serissimus*, 2n = 28; 6, *R. Haneziі*, 2n = 28; 7, *R. Huttonii*, 2n = 28; 8, *R. minnesotanus*, 2n = 35; 9, *R. Cardianus*, 2n = 35; 10, *R. Wiegandii*, 2n = 36; 11, *R. meracus*, 2n = 49; 12, *R. flagellaris*, 2n = 63.

Chromosome behavior at meiosis

Studies of chromosome behavior at meiosis may add to the understanding of natural relationships of plant forms, especially questions of hybridity. The pairing of the chromosomes in groups of two, three, four or even more in the early meiotic stages and the assortment of the chromosomes to the spores in subsequent stages may help to determine the probable origin of forms. Such data can often be used to determine whether these forms are hybrid in origin, autopolyploid or allopolyploids. Irregular chromosome behavior during the meiotic divisions may be due to several causes, such as hybridity and gene differences influencing synapsis or pairing of the chromosomes; or it may be due to polyploidy with multivalent association followed by irregular assortment of the chromosomes in the meiotic stages that follow. Aberrant behavior also may be caused by environmental conditions such as heat and cold.

57. CAMERA LUCIDA DRAWINGS OF MICROSPOROCYTES OF RUBUS AT DIFFERENT STAGES OF MEIOSIS, magnification about × 825. 13, *R. minnesotanus*, 2n = 35, chromosomes at diakinesis; 14–17, *R. Wiegandii*, 2n = 36; 14, chromosomes off the equatorial plane at metaphase I; 15, anaphase I; 16, late anaphase I showing lagging chromosomes; 17, telophase I with a lagging chromosome left in the cytoplasm; 18, *R. plicatifolius*, 2n = 63, telophase I with several lagging chromosomes left in the cytoplasm.

Meiotic chromosome behavior was studied in a number of species of Rubus with different chromosome numbers. The chromosomes are small and the configurations difficult to analyze. Data are presented only for those cells and stages for which definite interpretations could be made with no guess-work involved. These stages included metaphase I (Fig. 57, 14) and metaphase II (Fig. 58, 19) figures in which chromosomes off the equatorial plane but in the spindle or in the cytoplasm outside the spindle (19) were counted. It was not always possible to interpret these chromatin bodies with certainty but most of them probably were univalents. At anaphase I (Fig. 57, 15) and II (Fig. 58, 20) lagging chromosomes or chromosomes outside the spindle in the cytoplasm were counted. Similar data were gathered at telophase I (17 and 18) and telophase II (Fig. 58, 21). All the plants studied with the exception of two of the diploid 14-chromosome forms had some extra spores in addition to the four microspores normally



58. CAMERA LUCIDA DRAWINGS OF MICROSPOROCYTES OF RUBUS AT MEIOSIS AND OF SPORE QUARTETS WITH EXTRA SPORES, magnification about × 825. 19, *R. plicatifolius*, 2n = 63, chromosomes off the plate in the spindle and outside the spindle in the cytoplasm at metaphase II; 20, *R. Wiegandii*, 2n = 36, anaphase II showing lagging chromosomes; 21, *R. minnesotanus*, 2n = 35, telophase II showing a chromosome in the cytoplasm; 22–24, *R. Hanesii*, 2n = 28; 22, a normal spore quartet; 23, a quartet of spores with an extra spore; 23, a spore quartet with two extra spores.

formed as a result of microsporogenesis (Fig. 58, 22, 23, and 24). The frequency of occurrence of these extra spores is presented as a measure of the residual effect of the irregular chromosome behavior during meiosis.

The amount of irregular chromosome behavior in different species is summarized in Table II. More detailed data are presented below.

Table II. MEIOTIC CHROMOSOME BEHAVIOR—percentage of cells with chromosomes off the equatorial plane at metaphase I and II, lagging chromosomes and micronuclei at telophase I and II, and the occurrence of extra microspores at the quartet stage.

Rubus species	Chromosome number	Metaphase I %	N^a	Telophase I %	N^a	Metaphase II %	N^a	Telophase II & nucleate %	N^a	Extra spores %	N^a
allegheniensis	14	0.0	121	0.0	48	0.0	12	0.0	48	0.0	94
pugnax	14	0.0	130	0.0	13			0.0	15	0.0	180
Boottianus	14	5.4	279	1.8	54	1.4	71			0.8	242
Rosa	21	23.5	68	67.8	28	30.8	188	8.3	84	16.1	149
avipes	21	58.9	112			67.7	65			16.3	275
localis	21	50.8	63	46.6	15	37.9	66			24.0	204
serissimus	28	56.0	184	18.1	33					32.0	312
Hanesii	28			33.3	21	37.5	56			19.7	177
Huttonii	28	4.3	46	15.6	32	32.5	43			2.7	371
minnesotanus	35			8.9	112			4.1	318	10.9	137
Cardianus	35	100.0	32			86.6	15	35.5	93	54.2	166
Wiegandii	36	96.2	107	92.3	26			60.0	15	67.4	89
plicatifolius	63	56.8	139	61.9	42	69.0	55	25.1	155	22.9	96

N^a equals the total number of sporocytes or spore quartets observed.

Rubus allegheniensis, Porter

Somatic number = 14 (diploid—Fig. 56, 1)

At metaphase I, 121 microsporocytes were examined and no irregular chromosome behavior was observed. In 48 cells at telophase I, 12 cells at metaphase II, and 48 cells in the 4-nucleate stage no irregular chromosome behavior or micronuclei were observed. A total of 94 spore quartets was examined and no extra spores were detected.

Rubus pugnax, Bailey

Somatic number = 14 (diploid)

In 130 microsporocytes at metaphase I, 13 at telophase I and 15 cells at the 4-nucleate stage no irregular chromosome behavior was detected. No extra spores were found in a total of 180 spore quartets.

Rubus Boottianus, Bailey

Somatic number = 14 (diploid—Fig. 56, 2)

Five of six microsporocytes at diakinesis had 7 bivalents each; one cell had 6 bivalents and 2 univalents. At metaphase I a total of 279 cells was examined; 14 cells had a chromosome, probably a univalent, off the plate in the cytoplasm and one cell had two univalents off the plate (total of cells showing irregularity = 5.4%). At telophase I, 1 cell in 54 had a uni-

valent in the cytoplasm. Eleven cells at interphase were regular. At metaphase II, 1 cell in 71 had a univalent off the plate. No irregularity was noted at anaphase II (14 cells) nor in the 4-nucleate stage (19 cells). One spore quartet had an extra spore, and 1 had 2 extra spores (0.8%, n = 242 quartets).

The meiotic behavior of these three plants was typical of diploids in general. There was apparently regular synapsis of homologous chromosomes in the prophase of meiosis I followed by regular disjunction and assortment of the chromosomes to the four resulting nuclei. As a result, each spore and gamete would contain a complete set of seven chromosomes. The diploid forms would be expected, on a strictly chromosomal basis, to be perfectly fertile and to breed true to chromosome number. The slight irregularity noted in *R. Boottianus* may be due to some environmental condition or it may have some obscure significance since some irregularity, although slight, was observed in all the stages studied.

Rubus Rosa, Bailey

Somatic number = 21 (triploid—Fig. 56, 4)

A total of 68 sporocytes was examined at metaphase I. Eleven cells had one univalent each, off the plate in the cytoplasm, 3 cells had 2 each, and 2 cells showed 3 each, making a total of 17 cells (23.5%) with irregular chromosome behavior. At anaphase I, 35, 16 and 2 sporocytes had respectively 1, 2 and 3 chromosomes lagging (38.1%, n = 139). At interphase 3 cells (21.4%, n = 14) had a chromosome left in the cytoplasm. At metaphase II, 41, 15, and 2 cells contained 1, 2 and 3 chromosomes respectively, off the plate in the cytoplasm (30.8%, n = 188). Three cells at telophase II and the 4-nucleate stage had 1, and 4 had 2 chromosomes or micronuclei in the cytoplasm (8.3%, n = 84). Twenty-two spore quartets had an extra spore and two had 2 extra spores (16.1%, n = 149).

Rubus avipes, Bailey

Somatic number = 21 (triploid)

At diakinesis univalent, bivalent and trivalent chromosomes were observed. Because of difficulty of interpretation the number of configurations is reported rather than types of configurations. In a total of 10 sporocytes, 2 showed 9 chromosome groups, 1 cell had 10, 5 cells 11 and 2 cells 12 groups. At metaphase I 45, 19 and 2 sporocytes had respectively 1, 2 and 3 univalents or configurations off the plate in the spindle or free in the cytoplasm (58.9%, n = 112). At metaphase II, 22, 14, 7 and 1 cells had respectively 1, 2, 3 and 4 such univalents (67.7%, n = 65). Fourteen cells examined at anaphase II showed 3 cells with 1, and 3 cells with 2 lagging chromosomes (42.8%, n = 14). In a total of 275 spore quartets 43 had 1 extra spore and 2 had 2 extras (16.3%).

Rubus localis, Bailey

Somatic number = 21 (triploid)

Microsporocytes at metaphase I had 1, 2 and 3 univalents off the plate in 23, 8 and 1 cells respectively (50.8%, n = 63). Four cells at telophase I had 1 univalent each, and 3 cells showed 2 univalents (46.6%, n = 15). At metaphase II, 21 and 4 cells had respectively 1 and 2 univalents. In a total of 204 spore quartets, 44 had an extra spore and 5 had 2 extra spores.

These three triploid forms exhibited meiotic behavior typical of autotriploid plants. At meiosis variable numbers of trivalents, bivalents and univalents were formed. At anaphase I in triploid plants a trivalent normally disjoins, two chromosomes going to one pole and one to the other pole. Univalents, when present, lagged and were lost to the microspore nuclei in many instances. Some of them divided in the first meiotic division and the halves were lost in the second division. In other instances univalents passed to one of the poles in the first division and divided in the second. The gametes of triploids have variable numbers of chromosomes; theoretically they may range from the *n* number (7 in Rubus) to the *2n* number (14). As a result the pollen of triploid plants is generally poor, sexual fertility is often low and progenies derived from triploid plants usually have a low survival value due to their aneuploid chromosome numbers. Triploid plants do not breed true to chromosome number through the seed except in certain cases of apomictic reproduction. Therefore, triploid forms which are established in nature are generally propagated by vegetative means.

No data were gathered relating to the fertility and the breeding behavior of the forms studied. These problems and also the problem of the origin and dissemination of the triploid forms in Rubus are important to an understanding of the genus, especially so if triploid forms are as common as indicated in Table I.

Rubus serissimus, Bailey

Somatic number = 28 (tetraploid—Fig. 56, 5)

Microsporocytes at diakinesis had from 12 to 15 chromosome configurations with 13 configurations in 3 cases (n = 7). At metaphase I, 72, 21, 9, and 1 cells had respectively 1, 2, 3 and 4 univalents (56.0%, n = 184). Six of 33 cells at telophase I had laggards or micronuclei in the cytoplasm (18.1%). In a total of 312 spore quartets, 80 had 1 extra spore each, 18 had 2, and 2 had 3 extra spores (32.0%).

Rubus Hanesii, Bailey

Somatic number = 28 (tetraploid—Fig. 56, 6)

Twelve, 13 and 14 configurations were observed at diakinesis (n = 5). At telophase I, 7 of 21 sporocytes had a univalent lagging or in the cyto-

plasm (33.3%). At metaphase II, 11, 9 and 1 cells had 1, 2, and 3 univalents, respectively, off the plate (37.5%, n = 56). In a total of 177 spore quartets, 32 had one extra spore each and 3 had 2 extra spores (19.7%, n = 177).

Rubus Huttonii, Bailey

Somatic number = 28 (tetraploid—Fig. 56, 7)

At metaphase I, 2 of 46 microsporocytes had a univalent off the plate (4.3%). Five cells at telophase I showed a lagging chromosome (15.6%, n = 32). At metaphase II, 12 cells had a lagging chromosome each and 2 cells had 2 each (32.5%, n = 43). In a total of 371 spore quartets, 9 had one extra spore each and 1 had 2 extra spores (2.7%).

The tetraploid species studied formed mostly bivalents at meiosis as indicated by the relatively high number of configurations at diakinesis. However, in two of the three species a high percentage of the cells had some multivalents and univalents present, with lagging chromosomes in anaphase I and II and extra spores at the microspore stage. With respect to the occurrence of multivalents these plants behaved at meiosis like induced autotetraploids of corn, snapdragon and other plants that have been studied. With the amount of irregularity present it would be expected that some of the functioning gametes carry more or less than the *2n* number of chromosomes (14) and that progenies would vary somewhat from the euploid number of 28. If these forms are propagated sexually through seed dispersal and the aneuploid plants are equally viable, a variation from the balanced *4n* number would be expected if large enough numbers of plants representing different clones were examined from different locations. One species, *R. Huttonii*, had less chromosome irregularity at metaphase I and fewer extra spores than the other two. The data are not extensive enough to attempt any interpretation of this observed difference in meiotic behavior but it would be interesting to compare the relative fertility of these three species. It is likely that autotetraploidy as well as allotetraploidy has functioned in the origin of forms of Rubus, autotetraploidy being characterized by multivalent association at meiosis while allopolyploidy would be suggested by the absence of multivalents.

Rubus minnesotanus, Bailey

Somatic number = 35 (pentaploid—Fig. 56, 8)

Five of 76 sporocytes (6.6%) had a lagging chromosome at anaphase I. At telophase I, 8 cells had one univalent each and 2 cells had 2 each (8.9%, n = 112). Two cells at anaphase II had 1 and 2 lagging chromosomes respectively (7.0%, n = 29). At telophase II, 11 cells in 318 had one univalent or micronucleus each and 2 cells had 2 univalents each (4.1%,

n = 318). In a total of 137 spore quartets, 13 had an extra spore and 2 had 2 extra spores each (10.9%).

Rubus Cardianus, Bailey

Somatic number = 35 (pentaploid—Fig. 56, 9)

At metaphase I the number of univalents varied from 1 to 5 with 8, 9, 13, 1, and 1 cell having 1, 2, 3, 4, and 5 univalents respectively (100%, n = 32). Seven sporocytes at anaphase I had from 2 to 4 lagging chromosomes in each cell. At metaphase II, 4, 8 and 1 cells had respectively 1, 2 and 3 univalents in the cytoplasm (86.6%, n = 15). At anaphase II, 5, 3 and 1 cells had 1, 2 and 3 univalents respectively (50%, n = 18). In 93 cells at telophase II, 23 cells had one univalent or micronucleus each, 9 had 2, and 1 cell had 3 univalents (35.5%). In a total of 166 spore quartets, 70 had an extra spore, 14 had 2 and 6 had 3 extra spores (54.2%).

It would seem impossible for such high polyploid forms as these, with an uneven number of sets of chromosomes, to show any regularity at meiosis. Actually, multivalent associations were formed as in the other polyploids, followed by lagging and irregular distribution of the chromosomes. It would also appear to be impossible for these forms to breed true sexually to chromosome number. The one species *R. minnesotanus* exhibited less irregularity at meiosis than *R. Cardianus*. In this connection observations on the fertility of these two forms would be of interest.

Rubus Wiegandii, Bailey

Somatic number = 36

(aneuploid, pentaploid plus one—Fig. 56, 10)

A total of 107 sporocytes were examined at metaphase I. Ten, 17, 20, 26, 11, 14, 2, 2, and 1 cells had respectively 1, 2, 3, 4, 5, 6, 7, 8 and 9 univalents off the plate in the cytoplasm (96.2%, n = 107). At anaphase I, 11 and 3 sporocytes had respectively 1 and 2 lagging chromosomes (93.3%, n = 15). At telophase I, 5, 12, 6 and 1 cells had respectively 1, 2, 3 ,and 4 lagging chromosomes or micronuclei in the cytoplasm (92.3%, n = 26). At anaphase II, 8, 15, 2 and 3 cells had respectively 1, 2, 3 and 4 lagging chromosomes (90.3%, n = 31). Nine cells (60%, n = 15) at telophase II had a lagging chromosome left in the cytoplasm. At the spore stage, 34 quartets had one extra spore, 9 had 2 extras and 7 had 3 extra spores (67.4%, n = 89).

This single plant of *R. Wiegandii* was the only aneuploid found in this study. At meiosis it exhibited more irregularity in chromosome behavior than any other plant studied. Whether this species is typically aneuploid with high meiotic irregularity can not be established definitely until many individuals of the species from numerous stations have been investigated.

Rubus plicatifolius, Blanchard

Somatic number = 63 (enneaploid)

At metaphase I, the number of univalents off the plate ranged from 1 to 6. In a total of 139 cells, 33, 28, 14, 2, 1, and 1 contained respectively 1, 2, 3, 4, 5 and 6 univalents (56.8%, n = 139). At telophase I, 12, 10, 3 and 1 cells had respectively 1, 2, 3 and 5 univalents lagging in the spindle or off in the cytoplasm (61.9%, n = 42). At metaphase II, 16, 11, 7 and 4 cells had each 1, 2, 3, or 4 univalents respectively off the plate in the cytoplasm (69.0%, n = 55). At anaphase II, 7, 5, and 5 cells had respectively 1, 2 and 3 lagging chromosomes (58.6%, n = 29). At the 4-nucleate stage 155 cells were observed; 25, 10, 3, and 1 cells had respectively 1, 2, 3 and 4 chromosomes or micronuclei in the cytoplasm (25.1%). In a total of 96 spore quartets 18 had an extra spore and 4 had 2 extra spores (22.9%).

This form showed the same type of meiotic irregularity prevalent in the other polyploid forms. As in the case of the triploids and pentaploids the question arises as to whether a form with an odd number of multiples of the base number 7 can sexually breed true to chromosome number.

General conclusion

This preliminary study of the chromosomes of certain species of Rubus has defined a number of problems which seem to be fundamental to an understanding of the genus. Of major importance is the problem of the reproduction and spread of these forms. In this connection extensive studies might be made to ascertain the amount of chromosome variation within species, especially in certain polyploid species such as *R. Wiegandii*. The fertility of the species should be checked and compared with their meiotic chromosome behavior. The possibility of apomixis in some of the forms should be investigated. A more complete understanding of the cytology and breeding behavior of Rubus would certainly throw much light on the obscure question of the origin of some of the forms, especially the triploids and other polyploids which apparently occur rather frequently in the Eubatus section of the genus.

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ARTICLE 4.
SPECIES STUDIES IN RUBUS.

By L. H. Bailey

This Rubus Fascicle is in two parts,—chromosome studies by John Einset, continuing species studies by L. H. Bailey.

These chromosome studies were undertaken at my request in order to develop methods and technique for cytological investigation in Rubus, with advice of Dr. L. F. Randolph and others of Cornell University, as well as to obtain suggestions on the relations of chromosome number and behavior to speciation in the genus. I am sure that the exact and devoted work of Dr. Einset is a beginning in careful technique in this important part of the study of Rubus. The studies indicate that chromosome number requires further attention as a factor in definition of species. Examination of 26 species shows only one (*R. Wiegandii*) that departs from the multiples of seven, and the multiples repeat themselves in species of very different character, as in the red raspberry, *R. strigosus* (21), and in the bush blackberries *R. canadensis*, *R. Rosa*, *R. bellobatus*, *R. avipes*, *R. localis*, and in the flat-creeping *R. signatus*, representing even different subgenera.

Heretofore it has not been possible to undertake cytological studies in North American Rubus in reference to species because the species have not been known. Knowledge of the species is not yet complete or even incontrovertible, but at least we are now able to find our way around in the genus. Moreover, in the present case it is possible to check determinations at any time because specimens of the plants with which Einset worked are in the Hortorium herbarium and the sheets are particularly marked.

Chromosome behavior, however, may give us useful hints and may disclose connections in phylogenies. The work is not yet sufficiently extensive in American Rubus to enable conclusions to be drawn. It is my wish that arrangements may be perfected whereby continued studies may be made in the hopeful fields of cytology in Rubus, not only in nuclear divisions but also in physiology, morphology, histology, sexuality, sterility, as well also as ecology, all by competent specialists in these directions, with the identificational materials preserved as herbarium specimens. I feel that much of the nuclear study in many genera has been too random. I would like to set aside a native area of an accepted Rubus species that probably will not be disturbed for many years in which cytological studies can be undertaken at different seasons and conditions until the chromo-

some pattern can be finally determined; this would lead to similar studies in other established species in the neighborhood, and to hybridization under definite control. Perhaps we shall find ourselves interested in the study of chromosome variations, as we now recognize the variables in taxonomic concepts. The nuclear and taxonomic situations should be studied together and not as independent or even as antagonistic adventures; and all studies should be permanently recorded in herbarium specimens in order that the species may be known positively, otherwise the work may not be science. Chromosome determination is not the primary approach to study of species of plants.

Such prolonged studies of colonies might also disclose some of the vitalistic reasons for the shift of species in them, both in respect to numbers of individuals and to persistence or disappearance or entrance of the different species themselves.

On the taxonomic side we are breaking new ground in Rubus. Whether other workers are ready to accept the proposed new species is of no consequence, not unless they are themselves students of the genus. Much corollary investigation may associate itself with this Hortorium work in which certain standards have been established and where the herbarium collection of Rubus, as this paper goes to press, is 29,673 mounted sheets.

THE TAXONOMIC STUDIES

This work in Rubus probably will break all contemporary records in respect of new findings in a North American genus of plants. I had expected much criticism, but very little of it has been forthcoming. Some persons think they believe that I have made too many species; yet that is a question of judgment, and a faulty judgment is always amenable to correction. Correctly speaking, I have never made a species: I have only recognized, named and described them.

One of the strangest quirks of the human mind is opposition to the founding of species. I do not know why this conceitedly senseless antagonism ever came into being. One would suppose that men would be glad to have all the entities on the planet recognized and named; such procedure should add greatly to interest in living. We accept other findings in science with ardor, even very technical discoveries that others can never verify or even comprehend; yet the taxonomist who pursues his investigation with equal honesty and conviction is met with indifference or even objection. In fact, the systematist is likely to be called either a "lumper" or a "splitter," two self-confident and disgraceful words that should never have come into the language in relation to work of the taxonomist; they mean nothing except to expose the prejudices of the objector, more vehement when the objector knows little or nothing about the group in question. It is supposed

that one of the graces derived from the study of science is to withhold judgment until there is reason for statement.

In these Rubus studies much more is involved than fussing about species, whether they are good or bad.

All work rests on its merits. The worker is not the jury or the judge. Time alone gives us the conviction, even though it may not be the answer. A biologist told me recently that all descriptions of new species should be forbidden because he had to learn so many new names. I wondered whether he thought himself a scientist. The situation has been obfuscated in recent time by the insistence that we know the genesis before we know the species or the specific concept, which is ridiculous.

One of the persistent questions about the Rubus work is whether I know the origin of my species. That is not a sensible question, nor can it be a primary part of taxonomy. The first problem in biology is to know the kinds of living things; from that beginning all other studies arise, and all possibility of accurate records. Much of our current teaching in biology begins at the wrong end and misses the point. In some cases students may develop an attitude of disdain of species, or even of contempt, yet we live with species and the unsolved genesis of them is a problem as keen and insistent now as in the days of Darwin.

There may be special reason for mental confusion in respect to species of Rubus because so many of them may grow in one locality and perhaps intertangled: therefore they are variants of one thing. Similar situation obtains in Carex. Some forty miles from Ithaca was an extensive blackberry tangle in which *Rubus canadensis* and *R. allegheniensis* were inextricably and luxuriantly intertangled: here is evidence (as reported to me) that one species is only a sport of the other. I took a workman with pick and shovel to the place and for hours we carefully dug many plants of each species and bared the roots. In no instance was there any union of the two species, nor did I find any intermediate seedlings or variables. A few years ago the place had been cut from the woods. Both species of Rubus grew in the neighborhood, and seeds had been scattered there, probably by birds. There were also two species of Acer in the neighborhood, but nobody had raised a question about them.

Regretting the present "decline in taxonomy," a European writer as reported in Biological Abstracts xxi, 674, thinks this decadence due to "petrified methods of phytography" "leading to extreme splitting of species." Here is the old bogy again, showing that the situation is not understood. It is then stated that taxonomic work should be placed in "the hands of other disciplines, such as phytogeography, genetics, and comparative morphology"; this procedure would lead to endless futilities.

Taxonomy is its own discipline, and is fundamental to the study of the

vegetation of the earth. Phytogeography, genetics, morphology, and the others do not provide the measures of species. These measures are obvious in the organisms themselves and in the differences from other species, and are expressed in good descriptions and plates and are evident in herbarium specimens that can be checked generation to generation. There is no satisfactory evidence as yet to show that species can be made to conform to the current desire to express all things formally and in mathematical language. Cytology cannot take the place of taxonomy. When species have been cautiously described and named, we are ready for other studies, and these studies may shed much light on relationships and origins and perhaps may suggest revision of judgments on specific identities. However, a species is an entity in spite of other "disciplines" and of attempts to define it out of existence. Comprehension of species is to be approached from the point of view of the trained collector.

The "decline in taxonomy," if there is such a decline, is due to erroneous teaching.

A species is apparent to an attentive observer by its gross characters. It may vary in many directions but this fact does not necessarily lessen its validity. Species are necessarily described from dried specimens, which are carefully preserved as evidence. These dead specimens do not lend themselves to cytological studies. Most admirers of species cannot make such studies even with living materials, and if we await such investigations then species cannot be popularly known. Only part of the species on the planet are yet known: what is to be done with the remainder of them?

This Fascicle is about Rubus. Thus far I have tried to clear away some of the rubbish. These problems were discussed in the early pages of Fascicle ix (1945) but I must make an additional presentation. In that Fascicle I stated that the papers were only a prodromus or preview, and that additional studies would result in other publications. Here is the first addendum.

In the preface to the prodromus (not yet a monograph), November 1945, I wrote that many novelties are yet to be described in Rubus, some of them representing accumulations in sections then already published and others that awaited fuller materials. In 1946 about 500 new collections came to me for identification, my own collecting had continued, and I have had opportunity to review some of the species then only recently founded and described. My general conclusion then was that I "erred on the side of overcaution" in the writing of Species Batorum; at that period many recognized but undescribed species were in my collections, some of them with drawings completed and not engraved, "withheld for the accrual of fuller evidences." Even yet there are many unknown species in the In-

serendæ (species to be inserted) or waiting materials filed in the cases at the end of the main species. Many of these will be worked over by my successors in the years to come, and I may yet be able to attack some of them.

Geography of these species is interesting, from Maine to Quebec and Minnesota and Texas, not to mention Central America.

I am asked for proof or at least for opinion that my novelties are not hybrids or apomicts or other irresponsibles rather than species; of course no man has such proofs, and if we wait for them we shall not understand Rubus or the vegetable kingdom. Perhaps, from what I am told, the Rubi are in a state of nascent variability (if there is any such state) and we are just catching them at it. Let all such objections pass. We should now have gone beyond the guess-work epoch in the study of Rubus.

We have had an epoch of guess-work. Fragments that could not be identified were painlessly listed as recent or sub-contemporary hybrids. Before me is a list of 237 published hybrids in North American Rubus, representing the work of two authors. This figure does not greatly exceed the number of new species recently described. These are only assumed hybrids, not tested by experiments, called hybrids because there was nothing else to do with the little pieces. I remember that one of the "hybrids" was postulated between two species one of which grows only in eastern Massachusetts and the other in Missouri; fortunately the mechanism of cross-pollination did not need to be worked out.

In North American Flora, 1913, Rydberg describes 77 species of Rubus north of Mexico and 179 recorded hybrids, the origin of every one of which is unknown. There is no way of identifying these vagrants for in most cases the entries are only listed rather than technically described. At that time the species themselves were only hazily known. Unfortunately there is still a residuum of this practice in recent authors.

The hybridity dogma

Ascription of hybridity by all authors in Rubus appears to be based on pre-Mendelian notions. Mendelism shows that hybrid progeny is not regularly intermediate, and that the characters depend on the generation arising from the original cross. This truth is verified in numberless studies in artificial hybridization. We have made no attempt in native Rubus to determine or to analyze these generations. Yet from first to last we have assumed that in the brambles intermediateness is a mark, perhaps a very proof, of hybridity. This doctrine has become a dogma.

Again, what is an intermediate? In my experience, brambles confidently are thought to be intermediates if they look so; yet some of them turn out, on careful examination, to be good separate species and perhaps even not

closely related. If a man does not know the different species, how can he know the intermediates between them? Intermediates must be as critically studied as the species themselves. Study of variables in Rubus is yet hardly begun in this country. Yet we derive mental solace by calling anything we do not understand a hybrid.

We tacitly expect all species of Rubus to be crossable, and yet we have no experimental evidence of such promiscuity. In no other genus have we set up so many hindrances to the understanding of it.

Hybrids probably arise spontaneously in nature. We conclude them to be hybrids because they grow with or near plants reliably assumed to be parents, because they may be intermediate in character (not taking into account whether representing F_1 or other generations), because the plants are relatively few in number, and because they do not possess clear characters of separation. They are exceptions, so far as number of plants is concerned.

On this basis, I have not described any Rubus as a hybrid. This is not because natural hybridity in the genus is denied, but because I wait for evidences. Perhaps some of the variables that lie unnamed in the herbarium are hybrids. The possibility is always in mind. But when a supposed hybrid grows freely by itself over a thousand or hundreds of miles of territory and holds its own in character, I am entitled to doubt.

We must not confuse this taxonomic hybridism, which is only an escape from difficulty, with actual hybridization, which is a subject of tremendous significance, a field of fruitful experimentation, basis of much of our effective plant-breeding.

Before me is a recent paper in which one of my Rubus species is questioned as perhaps a hybrid. Of course I cannot dispute the opinion; yet the plant grows in abundance over thousands of miles of territory beyond the writer's locality and holds its characters throughout its vast realm; it is also much more than an intermediate.

Perhaps the species of Rubus originated in remote time as hybrids, but that is another and a theoretical question; I cannot disprove it, nor am I obliged to accept it. Attempts to demonstrate it on speculative grounds are likely to lie lightly with the taxonomist.

History

My first publication on the taxonomy of Rubus was in 1890 when I attempted to account for the cultivated dewberry and invented the name *roribaccus* for it. Then followed other efforts to account botanically for cultivated blackberries and raspberries, employing as a background the accepted nomenclature of that day, now known to be erroneous. It was soon apparent that a wholly new approach must be made to the study of

Rubus, and I began to collect material both in cultivation and in the wild in preparation for a subsequent study: on that study I began to publish in 1941 (Gent. Herb. v). I have emphasized the necessity of good and complete specimens and invented terms (as *primocane, floricane, parcifrond*) for the different parts. In recent years I have had accessions from many collaborators, and the collection is still growing rapidly. It is now part of the Hortorium herbarium. Many of my new species are still growing in my garden, and their differences stand out uniformly and clearly year after year.

Such a reservoir of classified specimens provides records of distribution and variation. Ranges of several species known in the original diagnosis from only a single locality are now known to occur in several states, at the same time that other species are yet strictly local. Naturally, these extensions of range with attendant variation raise the question whether some of the species run together and will need to be combined in subsequent treatments; I have not yet found this result although always looking for it; I oftener get the suggestion that the few cosmopolitan species, as *R. allegheniensis R. canadensis, R. hspidus,* may perhaps be separated into distinguishable species or varieties. As yet I have not felt safe to describe many varieties inasmuch as the genus is so little known with us, and the concept of "variety" is yet in flux.

The case of *Rubus canadensis* is suggestive. It was described by Linnæus in 1753; one hundred and thirty-eight years later Britton first recognized it (as *R. Millspaughii*), yet it is widespread and abundant in North America. It was six years later, however, that I examined the Linnæan type and found that *R. Millspaughii* is *R. canadensis*; thus it was one hundred and forty-four years in which this dominant species was unknown to botanists. In the meantime, untold numbers of hungry people had picked the fruit of it.

It is an amazing fact that two species of Rubus that have yielded important pomological varieties to fruit-growers for generations should have remained botanically unknown until two and three years ago. They are *R. Rosa* and *R. bellobatus*. These species are native and wild over great distances of eastern North America and are so distinct that they can be recognized at a glance.

I am more and more impressed that the recently described species of Rubus are "good." Certainly they are not clons or sports or soil variants or local adaptations or exceptions. There has been no effort whatever on my part to find differences in Rubus populations that might be described as species. The approach has been the same as one follows in Carex or Potamogeton or Ficus or Veronica.

These abundant specimens provide means of checking the keys in my

Species Batorum. Keys are always difficult to make in a large genus, and in Rubus particularly because the plants are variable and in most cases even the best of specimens do not present all the parts of the plant. It is only with good and representative materials that any key can be made "to work." While a few betterments can now be made in my keys and inconsistencies eliminated, I have not found it advisable to change the general plan of them.

Some of the trouble with keys lies in the concept of the particular species itself. Thus, *R. vixargutus* is probably two species rather than one. In my herbarium the sheets are separated as two species, but I await publication until the Rubus flora of Lookout Mountain is more consistently collected.

Perhaps the most debatable part in the taxonomy of Rubus is the subdivision of the genus for monographic treatment. In the main I have followed Focke in his epochal Species Ruborum, 1910. His schema works very well, although not all species fall readily into one Section or another. I have tried other classifications, with much less satisfaction. The sectional subdivisions should be such as are adaptable to work with herbarium specimens, that is, marked by evident morphological characters rather than by gross habit of plant which is not readily transferred to an herbarium sheet and is subject to personal interpretation.

Knowledge of Rubus in North America is yet insufficient and new. In the early days few species of plants were recognized, both because exploration was fragmentary and the concept of specific differences was not developed. There was no obligation "to prove up" a species or to keep a type specimen. Thus, in Manasseh Cutler's Account of the vegetable Production naturally growing in this Part of America, Boston, 1785 (Mem. Amer. Acad. Arts & Sciences I, 396–493), only six species of Rubus are noted, without specific names; of Œnothera two species, of Cratægus two, of Rosa one, Aster three, Cyperus one, Carex not included. In that century specimens of plants, particularly of the woody species, were meager and perhaps only scraps of tip parts; modern size of herbarium sheets had not arisen; if specimens were taken, there was constant effort to save space, and they were likely to be kept in books. A plant like a raspberry or a blackberry, with two forms of growth, was not represented in both forms, if even carefully in one form.

The reader may be glad to know that Manasseh Cutler, 1742–1823, of New England, was minister, researcher, teacher, competent astronomer, energizer of the Ohio country, member of the American Philosophical Society, explorer of the White Mountains whereby he was remembered by Tuckerman in *Salix Cutleri*, now included in *S. Uva-ursi* although Tuckerman thought them distinct, and by Fernald in *Solidago Cutleri*, native in high mountains of New England and New York.

Not even yet are all the Rubus collections commendable. One of the universities recently sent me their entire mounted Rubus collections for determination. I assorted them into two piles,—one large lot that could not be named because the material was too poor, and a smaller lot on which I was able to place names. They replied that they had burned the larger lot; I complimented them on their discretion.

It is interesting to note the numbers of species of Rubus in some of the early manuals of the northern and middle United States: Amos Eaton, 1818, admits 13 species; Beck in 1823 has 16 species; Torrey, 1826, has 12; Gray, 1848, includes 10. For North America: Amos Eaton, 1836, 29 species; Torrey & Gray, 1840, 23 species; Watson, Index, 1878, 21 species (excluding *R. Dalibarda*) and varieties.

Specialists in certain genera or families were little known in the early days, even though Chester Dewey had opened up the genus Carex and M. S. Bebb had taken unto himself the bothersome genus Salix; George Engelmann had begun to elucidate the cacti and certain other genera. Nowadays we have authorities in genera and families. Now we recognize batologists, or devotees in Rubus.

Early American batologist was William H. Blanchard, school teacher in Vermont. He saw that the brambles could not be understood until one studied both the sterile first-year cane and fertile second-year cane from the same plant. Before me is a specimen he sent to me in 1901 with primocane to ask my opinion of its species. He began to publish in 1904 with *R. vermontanus*, and followed in the next few years with more than forty novelties. His work was ignored by Britton & Brown in the second edition of Illustrated Flora, 1913, the third edition of Britton's Manual, 1907, partially accepted in Gray's Manual of 1908. Now we accept his work at full value. Blanchard was not a trained taxonomist, but he was an assiduous observer of Rubus in the field and profuse collector. His specimens were sent to the Gray Herbarium, New York Botanical Garden, and National Herbarium; his personal Rubus herbarium was purchased by Bailey in 1918. His years were 1850 to 1922. Portrait of him may be seen on page 141 of Gentes Herbarum 1.

Contemporary with Blanchard but outliving him was Edward Strieby Steele, 1850–1942, scholar, philosopher, botanical taxonomist. He was a persistent collector of Rubus within a radius of one hundred fifty miles of Washington, D. C. This range covers a remarkable territory from sea level to the Alleghany plateau. His specimens of Rubus are abundant and excellent; he took other plants as well. He proposed many new species of Rubus, but his superior officers did not "believe in" them and they were never published. Steele supposed that 75 species of Rubus are native within one hundred fifty miles of Washington, a prophecy then considered absurd.

This number is already about fulfilled, and more of them will be separated when his great collections are finally adjusted. In adjusting them one is guided by Recommendation of the International Rules of Nomenclature not to take up unpublished names not formally authorized for publication by their author.

Both Blanchard and Steele were devoted field men. They did not accept the hybridity solution of taxonomic puzzles. Both men were thought by associates to be at least "queer."

Three other persons unfortunately not now with us were early concerned in Rubus. They are Per Axel Rydberg, 1860–1931, in his later years connected with the New York Botanical Garden, who wrote the first comprehensive treatment of American Rubus in Britton's North American Flora, 1913; Ezra Brainerd, 1844–1924, President of Middlebury College, Vermont, collector and publisher on Rubus; Eugene Pintard Bicknell, 1859–1925, banker and naturalist, ardent collector of Rubus in New England but did not describe new species. These three diligent workers are now remembered in *Rubus Rydbergianus, R. Brainerdii, R. Bicknellii*. They propagated the hybridity panacea of the insolvables in the brambles.

To this period also belongs Nathaniel Lord Britton, 1859–1934, in whose many taxonomic works the Rubi received appropriate attention and with whom the present writer undertook to agree in our long and pleasant association.

In the course of the bramble work I have had occasion to express my obligation to the Gray Herbarium of Harvard University for access to the great collections and to the helpfulness of the staff. This is my cheerful duty inasmuch as at the Gray I was under guidance of the master and knew the herbarium well. At present the Rubus species are under study at the Gray by Merritt L. Fernald, with whom I am in sympathetic contact: note *Rubus Fernaldianus*, Gentes Herbarum v, 730 (1945). He has pointedly challenged the superficial hybridity explanation of puzzlements in Rubus.

The illustrations

In the joy and eagerness of collecting, all the Rubi of a locality may seem to be alike or at least only forms of alikeness. When significant parts of the plants are pressed and brought together for comparison the differences begin at once to appear, if the eye has been trained to know what the dissimilarities are like. Often I find myself convinced of the identity of a bramble until I take it to the herbarium.

This is the primary reason why illustrations in the Rubus papers are in the flat. Drawings made from the living plant are impressionistic. Contrasts in essential details can hardly be expressed, or at least they are not complete or emphatic. The artist is impelled to make "a picture," but we require

diagnosis. Above all, we insist on reasonable accuracy. I gave an artist a living plant with alternate leaves to draw; he brought me a beautiful picture with leaves all opposite. When I objected he declared that he drew the plant as he saw it, which is the artist's privilege; I could only affirm that he never saw what he looked at, and I allowed him to retain his picture.

For more than sixty wishful years I have engaged artists. The drawings have run into the many thousands. It has been a rich experience. I begin the artist by asking her or him to draw a straight line freehand of even thickness two inches long. Rarely do they succeed. They are taught, they tell me, not to draw straight lines. Yet when I must show a cane or a pedicel of Rubus I must have it as straight as it is, and not made up of scratches pieced together.

These drawings of Rubus are made directly from the specimens, under close supervision and with dutiful care. The outlines are made over a pane of glass with a light underneath. The parts are drawn to measurement. The edges of the leaflets must be true to shape and scale. I myself use these pictures as rapid guides to species.

In a few cases there are errors. These faults are my own, due to unclear analyses of my material. These will be gradually corrected as I find them; the corrections are begun in this Fascicle, in some of the extra drawings. In most cases, however, these inconsistencies need not confuse the student.

I must warn that a picture on a single page does not record all the differences in species. There remain the habit of the plant, its size, texture of the leaves, dominance of one character over another, pubescence, glandulosity, hang of the foliage, and intangible qualities that a quick eye sees when it admires a bramble.

Period

Probably North America is the most fertile area on the globe for Rubus. Whether the species now described are too many or too few, I reckon that we may now know nearly or quite one-half the number of species native on the continent. Many of the states and provinces are yet scarcely touched for Rubus. When we have recovered from our fright we shall find the genus one of the most provocative in our flora for agreement and disagreement.

ADDITIONS TO THE PRODROMUS

Hispidi

In assorting the nine new species now added to the Hispidi, we may divide the Section into two categories: (1) those species that have hispid or setose primocanes; (2) those that bear stiff broad-based and mostly scattered pricklets on the primocanes, the armature firm enough to be

59. RUBUS ROWLEEI. Small trailer in north-central New York; primocane leaflets much more pointed than in *R. hispidus*, foliage not persistent over winter.

prickly or scratchy to the finger. None of these novelties bears glossy obtuse "evergreen" or persistent leaves or has the thin ground-surface stems of *R. hispidus*. To the first set belong *R. Rowleei*, *R. Huttonii*, *R. Davisiorum*, *R. Parlinii*, *R. vagulus*, *R. zaplutus*; in the second set are *R. furtivus*, *R. vegrandis* and *R. compos*.

Section Hispidi was set aside by Rydberg in 1913, with four species of which three are now included in the Setosi, leaving only *R. hispidus* to typify the group. To Rydberg there were no specific diversities in the true Hispidi even though Blanchard had differentiated five other species in 1906, *R. trifrons*, *cubitans*, *tardatus*, *jacens*, *permixtus*. Several species have been recognized in the Hispidi in the meantime, two of which are significant in expanding taxonomic problems in the Section. One of these two is *R. vigil* in 1925, which clarified the southern extension of the group; the other is *R. adjacens*, Fernald, in 1940 that cleared up some of the confusions in northern New England and the Maritime Provinces and defined *R. jacens* with which it had been confused.

We begin indeed to understand the Hispidi, yet *R. hispidus* is itself still uncertain. The name probably covers more than a single species. Var. *pervarius*, Bailey, will likely show itself to be distinct when it has been sufficiently collected. *R. sempervirens*, Bigelow, 1824, is not yet beyond doubt, and the very inadequate specimens left by its author are not convincing. Bigelow did not admit *R. hispidus* in his Florula Bostoniensis, perhaps because Linnæus ascribed it only to Canada although Amos Eaton had earlier admitted it to the "Northern and Middle States."

Other species already added to the Hispidi since my prodromus in 1941 are *R. mananensis*, Bailey in Weatherby and Adams, Vascular Plants of Grand Manan, New Brunswick (Contr. Gray Herb, 158, 1945); *R. kalamazoensis*, *R. distinctus*, *R. plus*, Bailey in Hanes, Flora of Kalamazoo County, Michigan, in 1947.

Rubus ambigens, Fernald in Rhodora xliii, 569 (1941), Virginia, was published a few months after my Hispidi treatment was issued; it is distinguished from *R. vigil* by being glandless and "its expanding primocane-foliage is whitish with dense pubescence, the mature foliage of both primocane and floricane pilose on both surfaces, softly so beneath."

Rubus Rowleei, spec. nov. Fig. 59.

Repens, radicans ut videtur; axis primocanorum hispidus, glandiferus: folia primocanorum 3–5-foliolata; foliola ovalia vel elliptico-ovata, 4–5 cm. longa, 3–4 cm. lata, abrupte brevi-acuminata, basis angusta, margines acute serrati; petioli hispidi, fortasse glandiferi; folia floricanorum 3-foliolata, petioli leviter pubescentes et inermes; foliola oblonga vel obovata, 3–4 cm. longa, apex brevi-acutus vel obovatus et obtusus, grosse serratus:

flores 6-10 vix folia excedentes; pedicelli hispidi, glandiferi; corolla parva, petala obtusa.

Flat hispid-acicular glandiferous creeper, with primocanes erect at least when young, leaves apparently not persistent, not clearly obovate, pointed unless on the floricanes.

Plant with trailing floricanes, probably tip-rooted, mat-forming; primocanes with hispid armature of different lengths and thickness with glandiferous hairs intermixed: leaves of primocanes 3–5-foliolate, dull, thinly pubescent on veins underneath; leaflets oval to elliptic-ovate, 4–5 cm. long, 3–4 cm. broad, broadest at about the middle, abruptly short-pointed, base narrow and sometimes tapered, margins nearly evenly sharp-serrate; petiole hispid, perhaps with a few glanded hairs: floricanes retaining some of the armature but probably none of the glandular hairs; flowering shoots short, erect, 6–12 cm. high, well foliaged; leaves 3-foliolate, dull, petiole lightly pubescent but without armature; leaflets oblong to somewhat obovate, 3–4 cm. long, very short-pointed to obtuse, coarsely serrate: flowers 6–10 in clusters just exceeding the leaves, the pedicels hispid and somewhat glandiferous; corolla small, 1 cm. across more or less, petals broad and obtuse; calyx pubescent, somewhat gland-bearing.

Northern New York: Mary's Lake, Parish, Oswego County, *W. W. Rowlee*, collected in 1894. Dr. Rowlee, 1861–1923, was long connected with Cornell University in botanical and forestal work.

This groundberry, *R. Rowleei*, differs from *R. hispidus* in the much stouter axes that are more acicularly armed, leaflets not broadly obovate and rounded and the serratures acute, flowers larger, foliage not persistent, not so freely tip-rooting as that species.

Rubus Huttonii, spec. nov. Fig. 60.

Prostratus, radicans, folia firma sed non nitida; primocani moderate setosi, interdum glandulari-hirsuti: folia primocanorum 3-foliolata, glabra supra, tenuiter pubescentia in nervis subter; foliola 4–6 cm. longa, 3–4 cm. lata, ovato-brevi-acuminata aut foliolum terminale aliquid obovatum, margines acute dentato-serrati; petioli pubescentes, setosi et interdum glandulari-hirsuti: folia floricanorum interdum trilobata: flores 5–8 in terminalibus racemiformibus racemis foliosis; pedicelli breves, erecti, pubescentes, setosi, sæpe glandiferi; corolla 12–18 mm. diam., petala obtusa; calyx pubescens, fortasse glandularis, lobi brevi-acuminati: fructus nigri, fere 1 cm. crassi, globulares.

Flat-trailing tip-rooting species making mats, not glossy-leaved, almost prickly rather than hispid and the primocanes bearing few glands and sometimes none, leaflets 3 and ovate- or somewhat obovate-pointed and sharply toothed, flowers 5–8 in terminal racemiform clusters scarcely exceeding the leaves.

Prostrate and creeping, with slender primocanes that take root late in season, foliage firm, partly persistent and dull in color; primocane axis bearing many retrorse prickle-like bristles 4 mm. and less long, more or less interspersed with gland-tipped hairs: primocane leaves 3-foliolate, petiole pubescent, retrorse-bristly and sometimes with glandular hairs;

60. RUBUS HUTTONII. Mountains of West Virginia, forming mats; note the ovate-pointed leaves, short nearly covered clusters; leaves pubescent underneath.

leaflets ovate, short-pointed or the terminal one somewhat obovate, 4–6 cm. long and 3–4 cm. broad, firm or stiffish, glabrous and becoming finely reticulated above, pubescent on veins underneath, lateral leaflets not unilateral and broad at base, margins sharply dentate-serrate: floricane leaves similar excepting sometimes trilobate rather than trifoliolate: flowers 5–8 in erect leafy raceme-like clusters, on short but slender minutely pubescent bristly and sometimes glandiferous pedicels that are shorter than the leaves; corolla 12–18 mm. diam., the spreading petals obtuse; calyx pubescent and hirsute, more or less glandular, lobes short-pointed: fruit black at maturity, globular, nearly 1 cm. thick, drupelets loosely aggregated.

West Virginia, in mountains: Randolph County, at Beverly, 2,000 feet, and along Cheat River in Cheat Mountain region, 3,500 feet, *Eugene E. Hutton Jr.*, and an attractive mat-forming plant as it grows in my garden from a root planted in 1942.

The affinity of this plant is with *R. trifrons* of southern Vermont: differs in its less shaggy and much less glandular character, broader and more ovate leaflets, less projecting and less racemiform clusters, smaller flowers with broader petals, leaves more pubescent underneath.

Rubus Davisiorum, spec. nov. Fig. 61.

Prostratus, repens; axes sparse hispidi et hirsuti, vulgo non glandiferi: folia primocanorum 3-foljolata, glabra, non lucida; foliola lato-lanceolata, 4–5 cm. longa, 2–2.5 cm. lata, acuta, acute serrata: flores 4–7 in gracilibus acsendentibus interdum glandiferis pedicellis, racemus angustus; corolla circa 1 cm. lata, petala angusta; calyx tenuiter pubescens, sine setis, pilis glandibusque.

Flat compact narrow-leaved trailer, canes with hispid hairs and slender hairs intermixed some of which may bear a small terminal gland, leaves narrow and pointed, flowers in long narrow glandless clusters but pedicels often scantily glandiferous.

Prostrate, apparently with short trailing runners, probably tip-rooting; canes loosely hispid and hairy, some of the hairs with tendency to gland-bearing but glands not easily observable: primocane leaves 3-foliolate, glabrous but not thick and glossy, petiole hispid and hairy and apparently glandless or very nearly so; leaflets broad-lanceolate to ovate-lanceolate, 4–5 cm. long, 2–2.5 cm. broad, pointed and apex usually acute, not cuneate, sharply double-serrate: flowers 4–7, about 1 cm. broad, on slender ascending sometimes gland-bearing pedicels in an upright elongated raceme; petals narrow and separate; calyx closely pubescent but devoid of hairs and glands.

West Virginia: along Cranesville Road in Preston County, *Mr. & Mrs. H. A. Davis 6640* in 1945 (type), *7371* in 1946. It grows on "islands" of soil on tilted flat rock of some acres in extent, and observed in nearby woods.

The species differs from *R. hispidus* var. *pervarius* of Windham County, Vermont, in the pointed not obovate and not *hispidus*-like foliage and the long narrow flower-clusters. It belongs in the group of *R. trifrons*, Vermont,

61. Rubus Davisiorum. Mat-forming species in mountains of West Virginia with very narrow and pointed leaflets, clusters of flowers also narrow.

but is a flatter plant on the ground, much less densely hispid and without the obovate broad obtuse or abruptly pointed leaflets, lacking strong upright shoots.

Rubus Parlinii, spec. nov. Fig. 62.

Robustus; axes ramosi, repentes procumbentesque, valde hispidi, plus vel minus glanduliferi: folia primocanorum magna, glabra opacaque supra, subter glabra et albidiora, 3–5-foliolata; foliola lanceolato-ovata vel angustiora, longo-acuminata, latissima in medio, 8–12 cm. longa, 4–5 cm. lata, grosse serrata vel dentata: floricani fere hispidi, prostrati, erectis hispidis ramis fertilibus 7 dm. vel plus altis: flores 6–8 in brevibus hispidis pedicellis glanduliferis in inflorescentiis terminalibus, et multi alii flores in axillis: fructus parvi, 6–7 mm. crassi, 10 vel paucioribus drupeolis; calyx parvus, non reflexus.

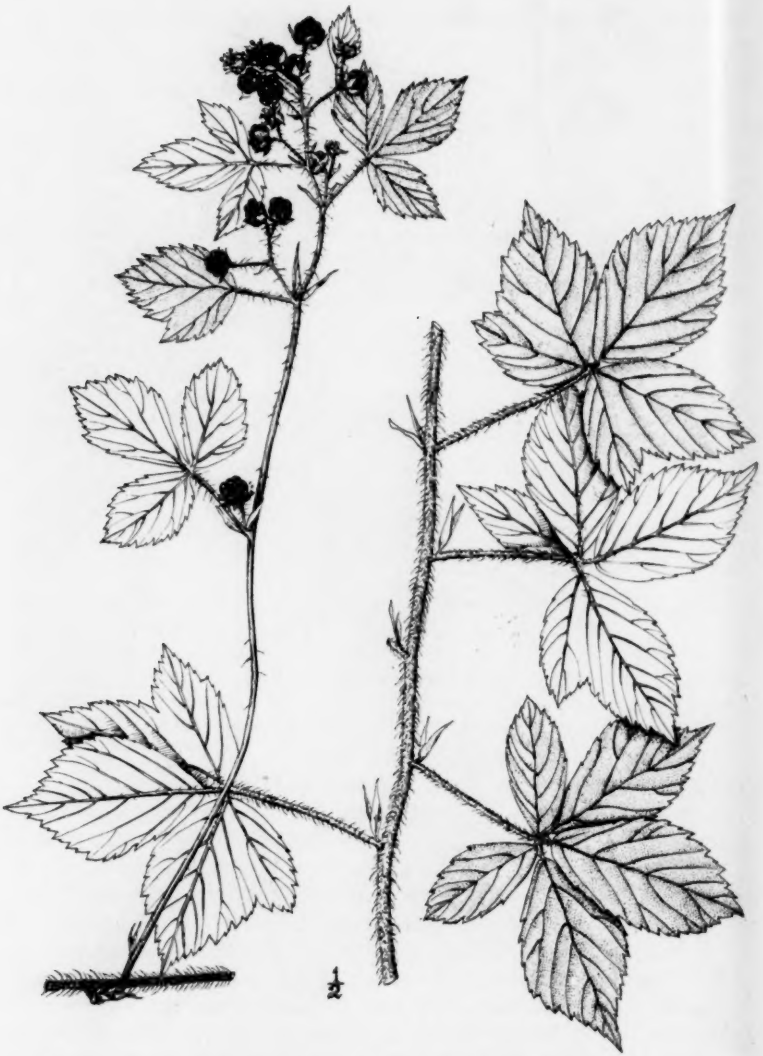
Coarse trailer, very hispid and somewhat glandular, with long-pointed coarsely toothed leaflets not obovate and few- to several-flowered terminal and axillary clusters.

Very leafy; primocanes stout, to 1 m. or more long, branching, axis profusely hispid and somewhat glandular, ascending, trailing late in season, apparently tip-rooting on some of its many slender ends, main axis 6–8 mm. thick toward base: primocane leaves 5- or 3-foliolate, petiole hispid and glandular, petiolules very short or almost lacking; blade glabrous and dull above, lighter colored and essentially glabrous underneath with prickles on the rib; leaflets lance-ovate and narrower, broadest at about the middle and not inclined to be obovate but long-pointed, narrowed to base, 8–12 cm. long by 4–5 cm. broad, coarsely and often doubly serrate: floricanes prostrate or procumbent, still more or less hispid and sometimes a few glands remaining, sending up long hispid fertile shoots; leaves mostly 3-foliolate or the upper ones simple, leaflets as on the primocanes except smaller: inflorescence terminal of 6–8 flowers on hispid and glandular pedicels 1–2 cm. long, and numerous other flowers in the axils below; calyx small, the lobes narrow-pointed: fruit small, perhaps 6–7 mm. thick, of 10 or fewer drupelets, abundantly produced, calyx not reflexed.

Southwestern Maine: at Buckfield, Oxford County, on ditch banks and grass lands, *John C. Parlin 14470* (type), *G. H. M. Lawrence & Parlin 604*; New Sharon, Franklin County, *Bailey 847*, primocanes nearly horizontal. To this species I refer fragments lacking collecting information sent me in 1901 by W. H. Blanchard postmarked Westminster, Vermont (page 201); also specimens from Groton, Connecticut, Jansson.

This species, *R. Parlinii*, is allied to *R. paganus* of northern New York, differing in its larger size, much stronger armature, larger leaves, leaflets not obovate but ovate-lanceolate and long-attenuate-pointed, serration grosser, inflorescence more scattered on elongate shoots, calyx-lobes longer and narrower and more acute. The very different leafage of *R. paganus* is shown in Fig. 63, which is an improvement over the picture on page 90 in Gentes Herbarum v.

62. RUBUS PARLINII. Shaggy prostrate plant in southern Maine with long-acuminate narrow leaves and leafy long flower-clusters.



63. Rubus paganus in northern New York, from which *R. Parlinii* is separated; note the broad short-pointed leaflets of no. 63 as compared with those of no. 62.

Rubus vagulus, spec. nov. Fig. 64.

Ascendens, deinde prostratus, probabiliter radicans; axis primocanorum dense hispidus, glandiferus, ramosus basi: folia primocanorum 3-foliolata, glabra; foliola late ovata, interdum obovata, 5–6 cm. longa, 4–5 cm. lata, obtusa sed brevi-acuminata, serraturæ latæ obtusæque, petioli hispidi et glandiferi, foliola lateralia sessilia: foliola floricanorum lato-ovalia, circa 4 cm. longa, obtusa: flores solitarii vel nonnulli in axillis et terminali, pedicelli setosi glandularesque: fructus parvi, 2–4 drupeolis; calycis lobi breves, erecti.

Low stiffly hispid glandiferous plant, not evergreen, forking, with ascending primocanes that become prostrate, leaves with obtuse coarse serratures, flowers few, axillary or terminal, fruit of very few drupelets.

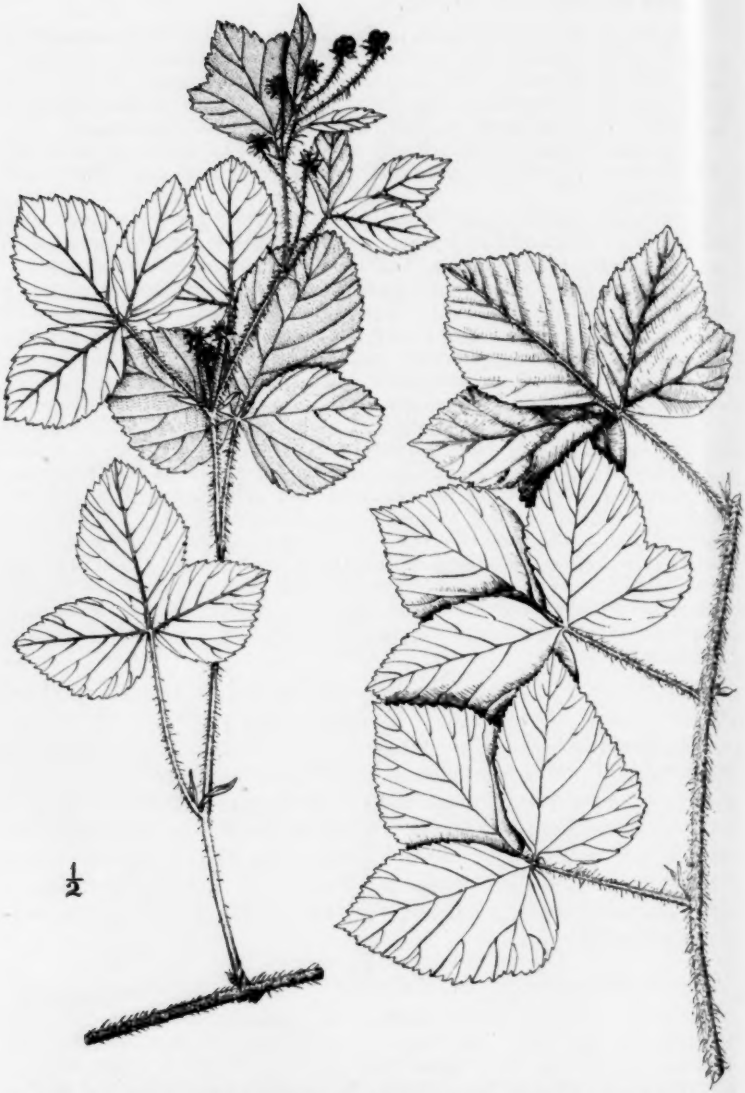
Branching low-mounding and prostrate plant with primocane axis 5–7 mm. thick toward base, thickly hispid and glandular-hairy and some of the armature becoming almost prickly, forking from near the base, perhaps 1 m. long, slender tips apparently rooting: primocane leaves 3-foliolate, glabrous both surfaces and somewhat prickly underneath; leaflets broadly ovate to somewhat obovate, 5–6 cm. long and 4–5 cm. broad, short-pointed to nearly obtuse, serratures broad and nearly or quite obtuse, central or terminal one usually broadest above the middle, base not cordate, lateral leaflets sessile; petiole 2–4 cm. long, hispid and gland-bearing: floricanes prostrate, the axis still bearing firm setæ and glandiferous hairs; leaflets broad-oval and about 4 cm. long and 3 cm. or more broad, obtuse or very nearly so, bluntly serrate to crenate, the uppermost simple ones more or less obovate: florescence mostly on thin ascending hispid and gland-bearing shoots, the flowers solitary or several in axils and terminal, the slender pedicels setose and glandular; corolla not seen; calyx small, very glandular, lobes with short point: fruit very small, mostly of 2–4 fleshy drupelets, calyx-lobes erect.

West Virginia: in swampy pastures among sedges, Lake Terra Alta, Preston County, *Mr. & Mrs. H. A. Davis 7466.*

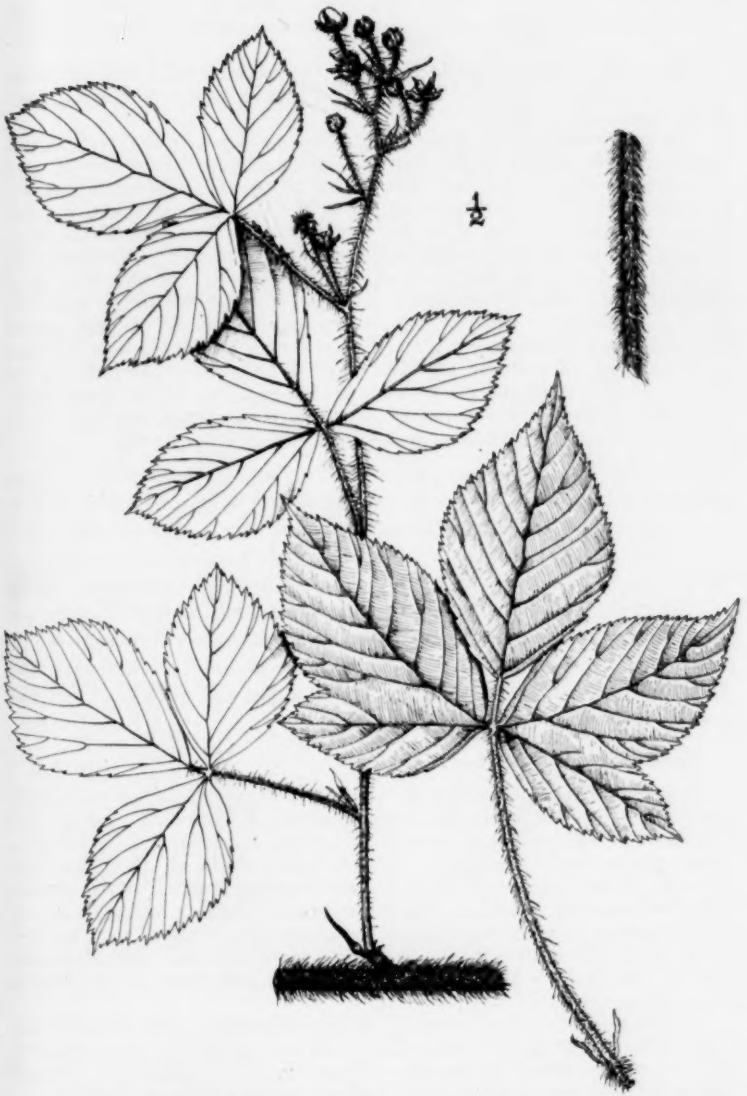
The species differs radically from *R. hispidus* in its larger size, more ascending habit, foliage not glossy or persistent, leaflets ovate and short-pointed, larger, serratures much coarser. Its closest similarity, however, is with the northeastern *R. adjacens*, from which it differs in the nearly complete lack of cuneate and obovate forms in its foliage and consequent difference from *R. hispidus*, more ovate and very broad leaf divisions, more obtuse and crenate-like serratures, very few small drupelets and presumably smaller flowers.

Rubus zaplutus, spec. nov. Fig. 65.

Magnus, robustus, valde hispidus et glandulari-hirsutus, radicans, procumbens; axis primocanorum 2–3 m. longus, 7-8 mm. crassus: folia 3-foliolata, foliola lateralia sæpe lobata, glabra vel opaca supra, fortasse pubescentia in nervis subter, margines compacte et non valde acute serrati; foliola ovata vel ovali-ovata, latissima in medio, 7–8 cm. longa, 4–5 cm. lata: axis floricanorum libratus, valde hispidus; foliola 3, ovalia vel cuneata:



64. Rubus vagulus of West Virginia. Leaflets very broad and apex short, not obovate, serratures very close; clusters leafy.



65. RUBUS ZAPLUTUS in mountains of West Virginia, with very shaggy canes, primocane leaflets acuminate, floral leaflets broad at middle or above.

flores 9–12, apicales in longis foliosisque ramis, in laxis inflorescentiis: fructus paucis drupeolis; calyx hispidus glandularisque, lobi longo-acuminati.

Large vigorous very hispid glandular tip-rooting trailer with abundant large not persistent leaves, flowers and fruits in open cymiform clusters about equalling the foliage.

Robust prostrate long-running branching plant 2–3 m. long; primocanes 7–8 mm. thick, shaggy with closely placed long reflexed weak reddish setæ with slender sometimes glandiferous hairs intermixed: primocane leaves 3-foliolate with lateral leaflets often strongly lobed, dull in color, glabrous unless on veins underneath, lateral leaflets sessile and terminal one short-petioled, the petiole and petiolules hispid and glandiferous; leaflets ovate to oval-ovate, 7–8 cm. long, 4–5 cm. broad at middle, tapering both ways from about the center, narrowed to base and to a medium or short-pointed apex, margins rather closely but not very acutely serrate, stipules narrow but prominent: floricane axis horizontal, still very hispid; leaves 3-foliolate; leaflets more oval and cuneate than those of primocanes: flowers 9–12 at top of leafy branches and a few others in axils; pedicels conspicuously long-setose and glandular-hairy, bracts prominent and elongated: fruit of few drupelets, the calyx glandular and hispid, lobes long-pointed.

West Virginia: Lake Terra Alta, Preston County, on bank above water level, and a colony on contiguous grounds of Brooks Bird Club, *Mr. & Mrs. H. A. Davis 7456* (type); south of railroad east, edge of town near dry pond, *E. S. Steele 76*, collected July 2, 1923. A strikingly vigorous roaming plant, whence *zaplutus* suggesting its very rich or abundant appearance.

The similarity is with *R. adjacens* but a stouter and more shaggy and more glandular plant and lacking the small obovate or cuneate obtuse leaflets at the base of floral shoots, pedicels notably profuse with long spreading hairs and setæ, primocane leaves larger and more gradually and acutely pointed; that is less *hispidus*-like.

Rubus furtivus, spec. nov. Fig. 66.

Repens radicansque planta glandifera valde ascendentibus primocanis junioribus, floribus multis in erectis ramulis e floricanis libratis; axis primocanorum hispidis et glandiferis pilis et sparsis aciculis: folia 5-foliolata, glabra supra, molli-pubescentia subter; foliola ovata vel angusto-ovata, 6–8 cm. longa, 3–4 cm. lata, acuta vel acuminata, acute duplo-serrata: folia floricanorum 3-foliolata, molli-pubescentia subter; foliola ovata vel elliptico-ovata, 3–4 cm. longa, acuta vel acuminata: flores 6–10 in inflorescentiis racemiformibus æquantibus vel excedentibus folia, pedicelli glandulares et divaricati; corolla 2 cm. diam.; calyx pubescens et glandularis, lobi anguste acuti.

Very low plant and tip-rooting, the new primocanes erect or ascending, hispid-prickly and glandiferous with 5-foliolate leaves and ovate pointed leaflets soft-pubescent underneath; flowers in short racemiform clusters that eventually exceed the foliage, pedicels and calyx glandular.

Floriferous glandiferous trailer, rooting at tips; primocanes often stout, nearly 1 cm. thick, terete, the axis bearing both hispid and glanded hairs

66. RUBUS FURTIVUS. Prominently narrow-pointed primocane leaflets, somewhat obovate floricane leaflets, clusters topping the foliage. New York.

as well as sharp pricklets, at first erect or strongly upcurving: leaves of primocanes 5-foliolate, very nearly glabrous above, soft-pubescent underneath; leaflets ovate to narrow-ovate, 6–8 cm. long, 3–4 cm. broad, either shortly or gradually acuminate, base narrow to more or less subcordate, sharply double-serrate; petiole armed and glandiferous: floricane leaves 3-foliolate, soft-pubescent underneath; leaflets ovate to elliptic-ovate, 3–4 cm. long, acute or acuminate, petiole gland-bearing: flowers 6–10 in a broad but racemiform cluster with spreading glandular pedicels and eventually somewhat exceeding the foliage; flowers about 2 cm. across; calyx pubescent and glandular, the lobes slenderly acute, probably not elongating.

Southern central New York: open sun in grassy high land, near Slaterville, Tompkins County, *Bailey 380*; flat on ground in open sun on edge of wood near VanEtten, *Bailey 359* (type), *365*. It is a free-flowering plant, showy by itself but likely to remain furtive or concealed in grass and low herbage.

Perhaps to be associated with *R. adjacens* but without the obovate leaf forms and cuneate bases of that species, and the acuminate leaflets soft-pubescent to the finger on the under surface.

Rubus vegrandis, spec. nov. Fig. 67.

Parvus, repens, radicans, parvis aculeis 2–3 mm. longis, non hispidus: folia 3-foliolata, parva; foliola 2–3.5 cm. longa, circa 2 cm. lata, lato-ovata, breviter acuta, stricte serrata, pubescentia subter, petiolus aciculatus, petioluli breves vel nulli: folia floricanorum 3-foliolata; foliola parva, ovalia vel ovata, vulgo acuta sed interdum obtusa: flores 6–10; inflorescentia æquans vel superans folia, valde lata, pedicelli divaricati et vulgo graciliter glandiferi; corolla 15 mm. diam.; lobi calycis reversi, pubescentes, acuti non elongati.

Trailer and tip-rooter, small and slender (*ve-grandis*, not very large, little), leaves small and pubescent underneath, flowers in a broad-as-long cluster that equals or exceeds the leaves.

Branching weak creeping plant glandless unless sparsely on some of the pedicels; axes armed with slender slightly bent pricklets 2–3 mm. long, not hispid: leaves 3-foliolate, not pergamentaceous or glossy, glabrous on upper surface, pubescent on lower surface; leaflets broad-ovate, 2–3.5 cm. long, about 2 cm. broad, briefly acute, broad at base, closely not very acutely serrate, petiole usually aciculate, petiolules very short or none: floricanes retaining the armature, hardly hispid; leaves 3-foliolate; leaflets oval to ovate, some of them obtuse but prevailingly short-acute, somewhat pubescent underneath: flowers 6–10, inflorescence racemiform with straight axis but pedicels 1–2 cm. long so that the cluster is about or nearly as broad as long, the pedicels somewhat spiculose and frequently bearing very slender glands; corolla about 15 mm. broad; calyx soon reflexed, short-pointed but not elongated, pubescent.

Northeastern West Virginia: Cranesville, Preston County, *Mr. & Mrs. H. A. Davis 7364*, in sand along edge of country road.

67. RUBUS VEGRANDIS, northeastern West Virginia. Related to *R. hispidus* but differs in not being hispid, in its soft leaves of unlike shape and the broader flower-clusters.

From *R. hispidus* this species differs in the soft dull rather than thick stiff and glossy foliage, lack of obovate and cuneate-based leaflets, pubescence on under surface, much broader and usually shorter flower-clusters with spreading rather than ascending pedicels.

Rubus compos, spec. nov. Fig. 68.

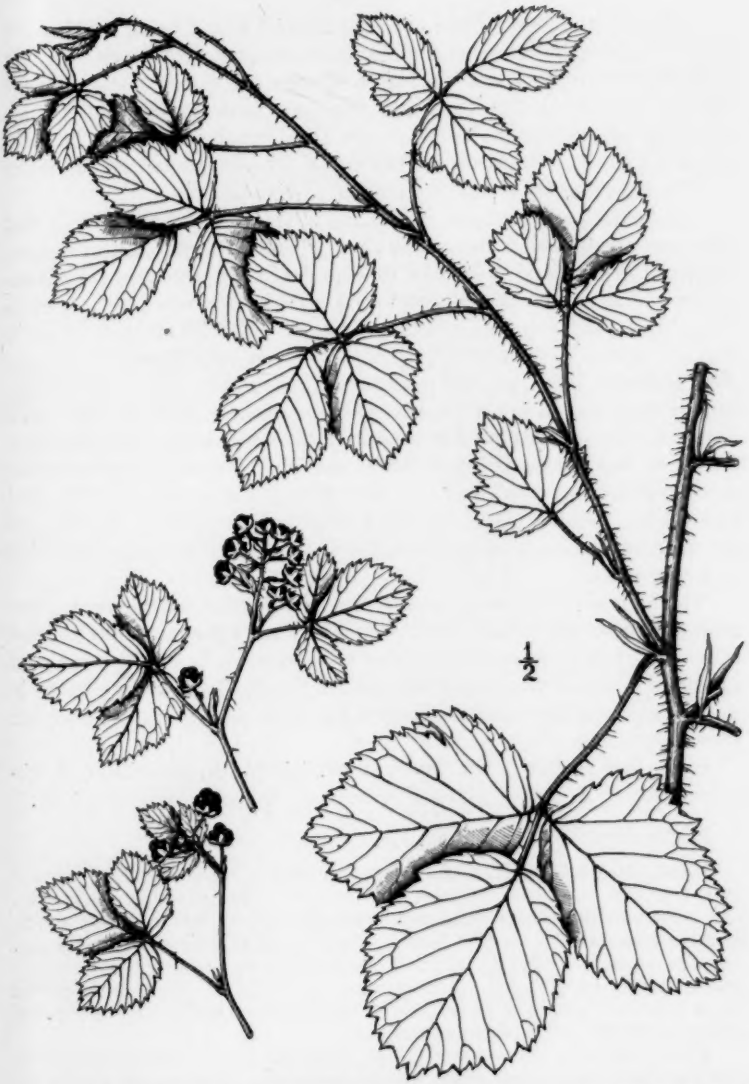
Robustus, libratus, valde ramosus, probabiliter radicans, primocani gracilibus, setiformibus, rectis vel curvis aciculis, eglandulosi: folia primocanorum magna, rigida, aliquid nitida supra, deinde glabra subter, 3-foliolata; foliola lato-ovata vel rotundo-ovata, 6–8 cm. longa, æque aut plus lata, brevi-acuta, raro plus vel minus obtusa, acute serrato-dentata: foliola floricanorum minora, oblonga vel elliptica: flores 4–9, in brevibus latisque racemis non folia excedentibus; pedicelli breves, hirsuto-pubescentes, interdum glandulares; calyx pubescens, lobi breves latique: fructus 6–8 mm. crassi, globulares.

Flat-running in large dense colonies or patches, probably tip-rooting, differing from *R. hispidus* in its more robust growth, prickly rather than setose character and lack of glands unless sometimes on calyces, larger leaves less glossy on upper face, leaflets hardly obovate and those on primocanes distinctly ovate-pointed, serratures much sharper, flowers in short hardly racemiform clusters.

Plant robust, growing close to ground and covering it, branches many and rising 20–30 cm., main canes 1 m. and more long; primocanes stout, glabrous, glandless or bearing only aborted remains of glands, armature of seta-like straight or bent pricklets 2–3 mm. long and well scattered along the stem: leaves large and thick, somewhat glossy in sun but prevailingly dull, 3-foliolate and lateral leaflets frequently lobed, glabrous and reticulate above and with prominent main veins, lightly hairy underneath along ribs at first but at length glabrous, petiole stout and bearing retrorse setose pricklets; leaflets broad-ovate to almost rotund-ovate, abruptly short-pointed, 6–8 cm. long and frequently of equal or greater breadth, margins acutely serrate-dentate: floricane leaflets smaller and narrower, often oblong to elliptic and sometimes nearly obtuse: flowers 4–9, about equalling foliage terminating short lateral branches, clusters mosly about as broad as long but frequently almost short-racemiform; pedicels short, stout, hairy-pubescent and perhaps bearing a few weak glands; calyx with short broad pubescent and more or less glandiferous lobes: fruit small, 6–8 mm. thick at maturity, of few loosely coherent drupelets.

Upper peninsula of Michigan in open land at edge of swale near Kinross in Chippewa County, *Bailey 745* (type), *746*, *747*, *748*, with low bushes and weeds; robust and striking plant of prostrate habit but saw no tip-rooting at time of collecting in latter part of August, then in fruit. It makes large flat colonies, taking possession: *compos*, master of its domain.

It differs widely from *R. signatus*, with which it may be keyed, by its trailing habit, less pointed leaflets, smaller inflorescence, less hispid armature.



68. RUBUS COMPOS in the upper peninsula of Michigan; armature not hispid, leaflets blunt, clusters small; vigorous trailer.

Setosi

Primarily the Setosi differ from the Hispidi in not being running and tip-rooting plants, but there are also good morphological characters that separate them even when specimens (if they are decent ones) may not disclose these particular features. I may have had doubts about the advisability of erecting the Section more than twenty years ago, but subsequent experience confirms its usefulness. The nature of the branching and the flowering habit separate the two sections lucidly.

This situation is the more interesting in view of the circumstance that we do not understand *Rubus setosus* (from which the Section takes its name) in nature. When Bigelow founded that species in 1824 from eastern Massachusetts, real specimens of Rubus were not made. We have poor fragments of floricane parts from his collections, one of which is carefully drawn in Fig. 50, Gentes Herbarum v. Undoubtedly the plant still exists in eastern New England, but I have not yet been able accurately to match the floricane parts in any of my collections with the Bigelow material, although I have a number of specimens waiting with *R. setosus* in the hope that they belong to that species. When sufficient material accumulates to verify the species we shall be competent to make a new diagnosis with description of primocanes; then we may recognize it confidently as part of our flora. In the meantime we may forego the satisfaction of referring almost anything to *Rubus setosus*.

The addition of eighteen new species to the Setosi has required a new study of the Section in the last five or six years, and the group holds together satisfactorily and the elements appear to be distinct. The newcomers clear up many doubtful points and consolidate the Section. Many partials in the herbarium suggest still other novelties when the collections complete themselves.

Other new species in the Setosi are *R. jejunus*, *R. perspicuus*, *R. dissensus*, Bailey in Hanes, Flora of Kalamazoo County, Michigan, 1947.

Rubus Boottianus, spec. nov. Fig. 69.

Planta crasse hispidis et glandularibus axibus, primocanus erectus sed sæpe ramosus et deinde diffusus, 5–7 dm. altus, floricani fere obliqui vel prostrati, non radicantes: folia primocanorum 3–5-foliolata, glabra supra, fortasse puberulenta subter; foliola elliptica vel elliptico-ovata, 6–8 cm. vel plus longa, 3–5 cm. lata, angustata e medio, longo-acuminata, margines grosse acute serrati: folia floricanorum 3-foliolata, foliola longo-acuta: flores singuli in axillis, 8–15 in racemo terminali; pedicelli hispidi glandularesque: fructus parvi, drupeolæ paucæ.

Plant making erect stools 5–7 dm. high but the floricanes sometimes prostrate but not rooting, upright axis shaggy-hispid and glandular-hairy, leaves 3–5-foliolate, leaflets elliptic and gradually acuminate, flowers many in racemiform clusters that exceed the foliage.

69. RUBUS BOOTTIANUS. Erect little bush with slender bristly canes, racemes topping the leaves, leaflets long-acute, corolla small with narrow separate petals. Massachusetts, Vermont.

Separate-looking species in small clumps of primocanes that stand erect 5–7 dm. and sometimes branch into long whip-like ends that may touch the ground but apparently do not take root, the axis thickly covered with short reflexed hispid setæ and glandiferous hairs: primocane leaves 3–5-foliolate, glabrous on both surfaces or puberulent underneath, strongly side-ribbed particularly underneath, petiole hispid and gland-bearing; leaflets elliptic to elliptic-ovate, 6–8–10 cm. long, 3–5 cm. broad, usually tapering either way to about the middle, long-acuminate to apex, margins coarsely sharply and upwardly double-serrate to almost dentate: floricanes retaining some of the armature and even glandular hairs, erect or oblique or becoming horizontal; leaves 3-foliolate or a few of them in the axis simple; leaflets like those of primocanes except smaller: flowers single in axils, then 8–15 of them in a terminal raceme-like cluster nearly or quite overtopping the leaves; pedicels hispid and gland-bearing; corolla about 2 cm. across, the petals narrow and separate; calyx hispid and glandular, the lobes remaining erect and short: fruit small, of few drupelets.

Eastern Massachusetts, southeastern Vermont: swamp at Hammond Pond (type locality), Newton Center, Middlesex County, Massachusetts, *Bailey*; Westminster, Windham County, Vermont, at the lily-pond, *Blanchard* collected in 1902, and another collection by Blanchard in 1904 without locality, primocane and floricane, presumably from Windham County, his home. The plant that has grown in my garden since 1941 from roots taken at Hammond Pond distinctly holds its own.

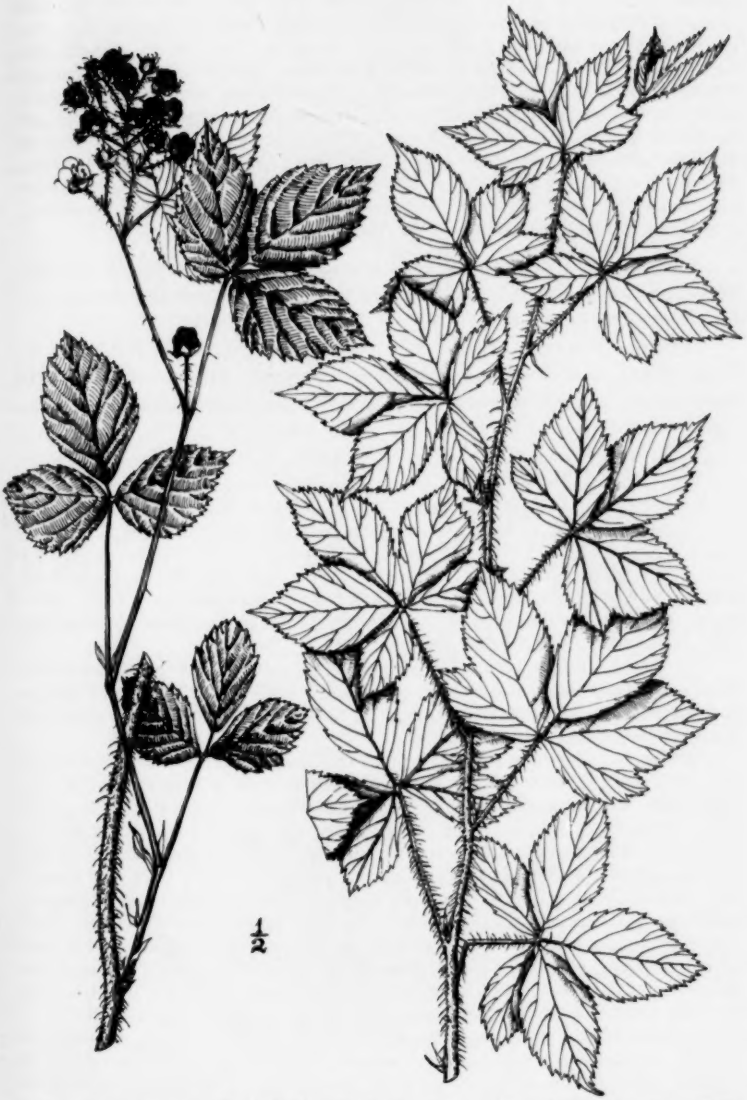
My early reminders of swamps in eastern Massachusetts are in association with William Boott, who pursued the enthusiasms of his brother Francis Boott, the caricographer, and who aided me in the study and collecting of the sedges, and who had also taken Rubus at Hammond Pond as early as 1864. William Boott was born in Boston in 1805 and died there in 1887. He was a cautious and considerate gentleman, careful and discriminating in his collecting, patient with a hopeful student. I now pay homage to his memory.

Rubus condignus, spec. nov. Fig. 70.

Humilis erectus foliosus sed parvifoliatus hispidus et glandiferus rubus 4–5 dm. altus: folia primocanorum 5-foliolata, glabra supra, subter puberulenta; foliola ovata vel aliquid obovata, 4–5 cm. longa, 3–4 cm. lata, plus vel minus angustata ad basin, brevi-acuta, grosse serrata; petioluli valde breves, hispidi, glandulares: folia floricanorum 3-foliolata, foliola ellipticoovata vel imperfecte obovata, grosse serrata: flores 7–15, in brevibus latisque inflorescentiis pæne folia æquantibus; pedicelli breves, hispidi et glandulares: fructus parvi, sicci.

Erect branching stifly hispid or aculeolate glandular plant 4–5 dm. tall, with small leaves and very short petiolules, leaflets ovate and short-pointed, coarsely and not acutely serrate; flowers and fruits in cymiform clusters equalling or slightly exceeding the foliage.

Many-leaved but small-leaved bushlet with axes loosely hispid but older parts becoming aculeate interspersed with glandular hairs, axis itself



70. RUBUS CONDIGNUS. Central New York. Leaflets not broadest above the middle, clusters compact and little exceeding foliage; canes aciculate but with few setæ.

terete: primocane leaves 5-foliolate with very short petiolules, glabrous above, puberulent on veins underneath; leaflets ovate or some of them with a more or less obovate form, 4–5 cm. long, 3–4 cm. broad, lateral ones nearly sessile, either broad or narrow at base, apex briefly acute, margins coarsely broadly serrate only the tip of the serrature acute; petiole hispid, more or less glandular: floricane axis maintaining armature and glands; leaves of floricane 3-foliolate; leaflets elliptic-ovate to somewhat obovate, coarsely serrate to almost dentate: flowers 7–15 in short cymiform to almost racemiform clusters that about equal or somewhat exceed the accompanying foliage; pedicels short, hispid, glandular; calyx small, perhaps somewhat glandular, lobes not extending: fruit small, seedy.

Northern central New York: in bog at Deer Pond, Redfield township, Oswego County, *Clausen & Hinkey 4456*. A condign or well deserved plant for recognition in our flora.

Distinguished from *R. significans* by its closer less sprawly habit, less setose canes, smaller primocane leaflets that are not broadest above middle, inflorescence smaller and much less loosely open, flowers few, pedicels less armed.

Rubus beatus, spec. nov. Fig. 71.

Erectus, valde hispidus, glandularis et foliosus, floricani ramosi, diffusi et interdum librati sed non radicantes, 4–5 dm. alti, primocani erecti et hispido-glandulares: folia 5-foliolata, glabra supra, molli-pubescentia subter; foliola ovata, acuta, 5–6 cm. longa, 3 cm. lata, subcordata basi, duplo-serrata; folia floricanorum 3-foliolata, molli-pubescentia subter: flores parvi, 3–8 in inflorescentiis racemiformibus folia æquantibus; calyx pubescens et glandularis, lobi non elongati.

Upright branching densely hispid and glandular little leafy bush with leaves soft-pubescent underneath; primocane leaflets ovate and not obovate nor tapered to base; flowers small, in many little raceme-like pubescent clusters that about equal the foliage.

Strong bristle-berry less than 1 m. tall and often a plant 4–5 dm. tall, dull in color, mostly erect; primocane axis thickly covered with short spreading or reflexed hispid setæ and glandiferous hairs: leaves of primocanes 5-foliolate, relatively small, glabrous on upper face, soft-pubescent to finger underneath; leaflets ovate, lacking the obovate or cuneate look of so many of the Setosi, terminal or central one 5–6 cm. long and about 3 cm. broad, short-acute but not acuminate, broad at base and commonly subcordate, margins doubly serrate; petiole hispid and glandular: floricanes retaining armature and glands, usually short-branched, often more or less lopping to nearly horizontal; leaves 3-foliolate, glabrous on upper surface and soft-pubescent underneath, ovate and subacute, 4–5 cm. long, coarsely serrate or dentate-serrate: flowers not numerous on the plant, 3–8 of them mostly in somewhat racemiform clusters that equal or sometimes slightly exceed the accompanying foliage, some of the lower flowers in the cluster usually not developing; calyx pubescent, variously glandiferous, lobes not elongating; pedicels pubescent, hispid, gland-bearing.

Northern central New York: in thickets on sandy land and in mossy

71. RUBUS BEATUS. Upright-arching low species, canes very glandular, leaflets ovate-acute that are soft-pubescent underneath, clusters racemiform. Central New York.

depressions, near Constantia, Oswego County, *Clausen 5855* (type), *5494*.

This plant suggests *R. Lawrencei* but the two species are wholly different, in the more erect and stronger habit of *R. beatus*, more hispid and more glanded canes, ovate-acute leaflets soft-pubescent underneath and sharper serratures, more compact and racemiform clusters of smaller flowers. The densely glandular-hispid axes and absence of obovate leaf forms take it away from *R. semisetosus*.

Rubus exter, spec. nov. Fig. 72.

Erectus, valde ramosus, foliosus, 1 m. vel minus altus, axes postremum recurvi vel prostrati sed non radicantes, hispidi hirsutique, non glandiferi, stipulæ prominentes: folia primocanorum 3–5-foliolata, glabra, non lucida, petiolus hirsutus non glandularis; foliolum terminale latum, 7–9 cm. longum, 5–6 cm. latum, angustatum ad basin, serrato-dentatum, abrupte acuminatum ad apicem, foliola lateralia lata vel angustissima: floricanorum foliola ovata et brevi-acuta vel anguste ovata, apex sæpe obtusus: flores 9–15, racemi lati, æquantes folia, pedicelli vulgo non glandiferi; corolla 1–1.5 cm. lata; calyx pubescens, interdum leviter glandularis.

Ascending bush with prominently hispid canes, broad ovate to elliptic glabrous leaflets, flowers in broad clusters about equalling the leaves in length, thinly hispid-hairy slender pedicels, with intermediate hairs that are sometimes capped with a small gland.

Plant 1 m. or less tall, bushy and branched, foliage firm but not glossy, canes the second year or at end of first year recurving to procumbent and somewhat trailing but not tip-rooting, apparently not glandiferous: leaves 3-5-foliolate, glabrous on both surfaces but not shining, long petioles sparsely hairy and setiferous but not glandiferous, stipules large; primocane leaflets broad, the terminal one nearly as wide as long, all of them narrowed to base, margins coarsely and broadly serrate-dentate with abrupt acute points, shouldered toward apex and abruptly acuminate, blade of terminal one 7–9 cm. long and 5–6 cm. broad, lateral ones often much narrower and then prominently tapered to base, sometimes more or less obovate in outline: floricane leaves 3-foliolate, leaflets ovate and short-acute to obovate and obtuse: flowers 9–15 in a broad open cluster with slender spreading thinly hispid sometimes faintly glandular pedicels; corolla 1–1.5 cm. wide, petals broad and close together; calyx pubescent, sometimes with few glanded hairs.

Western Wisconsin at Kinnickinnic, St. Croix County, *A. M. Fuller F-43-59*. An attractive floriferous foliaceous bramble.

This bushlet may be associated with *R. Lawrencei* of New York and Pennsylvania, but is a more glandiferous plant of smaller dimensions, primocane leaflets gradually rather than abruptly acuminate and lacking the obovate tendency, margins more coarsely and simply serrate, floricane leaflets less broadly rounded, flowers larger and fewer in the cluster, pedicels shorter and glandiferous, calyx with abundant glanded hairs.

72. RUBUS EXTER. Upright recurving plant, leaflets broad and abruptly acuminate, flowers in cymiform clusters mostly not much exceeding foliage. Western Wisconsin.

Rubus tectus, spec. nov. Fig. 73.

Parvus, erectus, vix ligneus, 3–4 dm. altus, non radicans; axis primocanorum sparse vel interdum abundanti hispida armatura et fere pilis glandiferis: folia primocanorum pauca, 3–5-foliolata, tenuia, glabra; foliola ovata vel angusto-ovata, 5–7 cm. longa, 3–4 cm. lata, acuminata, basis angusta, margines minute acuto-serrati; floricani vulgo armatura persistente: flores circa 6–9, condensi apice rami et sub folia operti; petala valde separata; calyx parvus, hispidus et glandularis; pedicelli glandiferi.

Low leafy scarcely woody more or less glandular little bush 3–4 dm. high with hispid canes and flowers hidden in the foliage (whence *tectus*, concealed or covered).

Erect, or floricane more or less curved, not tip-rooting, the thin primocane leafy at top and mostly about 2–3 dm. tall but perhaps to 4 dm. and bearing scattered or sometimes abundant short hispid aciculæ with few or many gland-bearing hairs admixed: primocane leaves 6–8 in number, 3–5-foliolate, thin, essentially glabrous both surfaces; petiole long and slender, hispidulose or bare; leaflets ovate to narrow-ovate and gradually long-pointed, 5–7 cm. long, 3–4 cm. broad, margins finely sharply and irregularly serrate, the serrature pointing forward: floricanes still bearing a scant thin armature and perhaps a few glandular hairs, with a few herbaceous upright branchlets: flowers about 6–9, aggregated near top of shoot but covered in the upper leaves, petals well separated; calyx small, lobes not extended to long points, it and the pedicel gland-bearing.

Nova Scotia: Truro, Colchester County, on upland both in sun and deep shade under bushes, *Bailey 650* (type), *653*, *649*.

The alliance of this attractive little bramble is probably with *R. dissimilis*, but the plant is lower and more compact, plainly glandiferous, leaflets much broader and less acuminate, serratures coarser, flowers in shorter clusters and covered under the leaves whereas they are typically nearly or quite free of the foliage in that species.

Rubus suppar, spec. nov. Fig. 74.

Humilis, minus quam 1 m., erectus; axis primocanorum sparse hispidus, glandiferus, folia densa: folia primocanorum 3–5-foliolata, glabra opacaque supra, parce pubescentia subter; foliola ovata vel elliptico-ovata, 6–8 cm. longa, 3–4 cm. lata, brevi-acuta, sæpe subcordata basi, stricte et acute serrata; petioli sparse hispidi et interdum glandiferi: rami florales erecti, 2–3 dm. alti; foliola elliptica vel aliquid obovata, 5–7 cm. longa, acute serrata: flores 7–15 in axillis superioribus et aggregati apice; pedicelli graciles, hispidi, glandulares; corolla circa 1.5 cm. lata, petala angusta; sepala angusta, reflexa in fructu.

Erect but low, with crowded leaves on primocane which is sparsely hispid and reddish, leaflets ovate to somewhat obovate and short-pointed, flowers in a loose open cluster at ends of upright shoots, pedicels hispid and glandiferous.

Apparently a small plant, probably much less than 1 m. tall; primocane axis terete, rather sparsely provided with short hispid hairs or aciculæ with a few glandiferous hairs intermixed: leaves of primocanes closely

73. RUBUS TECTUS. More or less erect Nova Scotian plant with acuminate primocane leaflets, clusters close and buried in the foliage, petals narrow and separated.

74. RUBUS SUPPAR in Nova Scotia with flowers in racemiform leafy clusters, leaflets broad and abruptly acute, closely serrate.

placed, 3–5-foliolate, glabrous and dull on upper face, thinly pubescent on under face; leaflets ovate or elliptic-ovate, 6–8 cm. long, 3–4 cm. broad, abruptly short-pointed, base narrow but perhaps subcordate, margins closely and finely acutely serrate; petiole sparsely hispid and sometimes glandiferous: floral shoots erect, 2–3 dm. long, leafy; leaves 3-foliolate or the uppermost simple, dull and nearly or quite glabrous above, shallowly pubescent beneath; leaflets elliptic to somewhat obovate, 5–7 cm. long, acutely serrate, petiole nearly or quite nude but pubescent: flowers 7–15, on pubescent hispid glandular slender pedicels in upper axils and some of them aggregated above the foliage; corolla opening flat or reflexing, about 1.5 cm. across when dry; calyx pubescent, apparently not glandular, lobes not long and reflexed in fruit.

Nova Scotia: dry land near New Glasgow, Pictou County, *Bailey 648*.

Affinity is apparently with *R. dissimilis*, from which it differs in its more upright and stouter character, stronger setæ, and particularly in the much broader more abruptly acute leaflets: *suppar*, close to, nearly equal.

Rubus angustifoliatus, spec. nov. Fig. 75.

Validus, erectus etsi floricani postea librati sed non radicantes; axis primocanorum aculeatus hispidus et glandiferus: folia 5-foliolata, magna, glabra, longo-acuminata et angustata ad basin, latissima in medio, 9–12 cm. longa, 4–5 cm. lata, acute duplo-serrata: axis floricanorum aculeatus glandularisque, folia multo minora, 3-foliolata vel simplicia: flores 2–8, semi-racemiformes, æquantes vel excendentes folia; pedicelli hispidi et glandulares; calyx pubescens, glandiferus, lobi divaricati: fructus succosi, comparate magni.

Upright stout prickly hispid and glandular plant with narrow long-attenuate primocane leaflets to twice or thrice as long as broad, floricanes becoming procumbent but not tip-rooting, flowers few in cymiform or imperfectly racemiform clusters on glandular pedicels.

Strong bush to perhaps 1 m. tall but floricanes lopping or nearly horizontal but not radicant; primocane axis beset with short sharp scratchy prickles intermixed with hispid setæ and gland-bearing hairs, heavily foliaged: leaves of primocanes large, conspicuously 5-foliolate, petiole long, prickly and glandiferous; leaflets prominently narrow and gradually taper-pointed, 9–12 cm. long by 4–5 cm. in width, broadest at about the middle, base very narrow, margins coarsely and acutely double-serrate, glabrous, dull and opaque above, terminal or central leaflet notably long-stalked: floricane axis retaining much of its armature and usually some of its hispid and glandular character; leaves 3-foliolate or some of them simple in the inflorescence, nearly or quite glabrous underneath; leaflets strikingly narrow or at least the central terminal one, in shape narrow-ovate or less, 5–7 cm. long and 2 cm. or more broad, coarsely double-serrate: flowers few, 2–8, in semi-racemiform clusters that about equal or slightly exceed the foliage; pedicels pubescent, short-hispid and glandular; calyx pubescent and more or less glandular, lobes spreading: fruit large for the Section, pulpy.

West Virginia: flats of Snowy Creek, east of Sanitarium, Terra Alta, Preston County, *E. S. Steele 167*, collected 1923, eight sheets in herbarium.

75. RUBUS ANGUSTIFOLIATUS. Primocane leaflets long and very narrow, gradually acuminate, acutely serrate, flowers not closely aggregated and about equalling the foliage. Eastern West Virginia.

76. RUBUS RACEMIGER in eastern West Virginia with conspicuously racemiform clusters and medium-broad acuminate leaflets.

Notably distinct in its narrow sprawly primocane leaflets and different from *R. nocivus* also in its harsh armature, and from *R. notatus* (to which I once tried to refer it) in its robuster nature, prickly rather hispid armature, elongated firmer leaflets that are not notched, and more raceme-like inflorescence that equals or perhaps overtops the leafage.

Rubus racemiger, spec. nov. Fig. 76.

Magnus, ramosus, diffusus, 6–10 dm. altus; axis primocanorum 8–10 cm. crassus, sparsis setis reflexis et pilis glandularibus: folia primocanorum 5-foliolata, glabra supra, subter molli-pubescentia et valde costata; foliola lanceolato-ovata vel elliptica vel ovata, latissima in medio, 7–10 cm. longa, 4–7 cm. lata, acuta vel acuminata, basis angusta, margines acute duplo-serrati; petioli hispidi et glandulares: floricanus hispida armatura, folia 3–5-foliolata; foliola elliptica vel ovata, molli-pubescentia subter, 5–7 cm. longa: rami florales erecti, 10–16 cm. longi; flores 9–13 in recta racemiformi inflorescentia; pedicelli divaricati, 1–2 cm. longi; calyx hispidus glandularisque, lobi non prolongati: fructus parvi, paucis magnis drupeolis.

Vigorous bushy branching hispid glandiferous very leafy plant making long slender lopping ends, flowers and fruits in racemes with continuous axis.

Sprawling; primocanes stout, nearly 1 cm. thick toward base, erect, bearing many more or less scattered reflexed or slanting stiffish setæ and intermixed gland-tipped hairs, upper part of cane prickly or acicular: primocane leaves 5-foliolate, glabrous above, soft-pubescent and strongly side-ribbed underneath; petiole and upper 3 petiolules acicular or short-prickly and more or less glandular-hairy; leaflets lanceolate to lance-ovate or elliptic or the terminal one oval-acute to ovate, 7–10 cm. long, upper 3 4–7 cm. broad, tapering or acuminate to long point, margins sharply and doubly serrate, base narrow or at least not cordate, lowest pair of leaflets very short-stalked: floricane branches spreading and recurving, ends probably sometimes rooting, rising probably to 6–10 dm. high, axis retaining some of its armature; leaves 3–5-foliolate, soft-pubescent and with stout lateral veins underneath; leaflets elliptic-ovate, often tapered toward base, acute, 5–7 cm. long, acutely irregularly serrate; floral shoots erect, 10–16 cm. long, leafy on lower part: inflorescence projecting, the axis straight and continuous to end of racemose cluster (whence *racemiger*, raceme-bearing); flowers 9–13, on well separated divaricate hispid and glandular pedicels 1–2 cm. long, terminal flower nearly sessile; calyx spreading, hispid and glandular, lobes not prolonged: fruit small, of few large drupelets.

West Virginia: at Terra Alta, Preston County, on Aurora Road at edge of town, 780 m. altitude, *E. S. Steele 62*, collected in 1926.

Closely related to *R. angustifoliatus* and perhaps an extreme variant of it: differs in axes much less hispid and less glandiferous, leaflets much broader and less acuminate, clusters more racemiform with pedicels strongly divaricate.

77. RUBUS NOCIVUS. Vigorous stout low plant with prickly and glandular stems, primocane leaflets broad and abruptly acute, clusters mostly not much exceeding foliage except in fruit. Eastern West Virginia.

Rubus nocivus, spec. nov. Fig. 77.

Ascendens, validus, floricani recurvi sed non radicantes; primocani erecti vel curvi, multis hispidiformibus rigidis aciculis et glandiferi: folia primocanorum 3-foliolata, glabra, firma; petiolus validus, armatus glandiferusque; foliola elliptica vel oblongo-obovata, 10–12 cm. longa, 4–6 cm. lata, acuminata, margines inæqualiter serrati: flores 12 vel pauciores in racemis æquantibus vel excedentibus folia; pedicelli glandulares et hirsuto-hispidi: fructus parvi, succosi.

Stout ascending very leafy hispid prickly and very glandular small shrub with more or less lopping floricanes, leafy floral shoots that bear short racemes that about equal the foliage.

Primocanes erect and then curving, reddish, profusely beset with sharp strong yet almost hispid pricklets (whence *nocivus*, hurtful) intermixed with glandular hairs: leaves of primocanes 3-foliolate or sometimes imperfectly 5-foliolate, firm in substance, glabrous both surfaces or perhaps puberulent on veins underneath, dull or opaque on upper face, lighter colored and strongly side-ribbed underneath; leaflets elliptic to oblong-obovate, 6–10 cm. long, 4–6 cm. broad, abruptly acuminate to a prominent point, margins sharply unevenly serrate; petiole stout, unequally acicular and glandular: floricanes retaining some of the scratchy armature; leaves 3-foliolate or reduced to a single leaflet in the inflorescence; leaflets ovate-acute to elliptic-acute, sometimes broadest just above the middle, 5–7 cm. long, margins coarsely unevenly serrate to almost jagged: flowers a dozen or fewer, in racemes that may slightly exceed the leaves; pedicels hairy-hispid and glandular; calyx sometimes bearing a few glandular hairs, the lobes not elongating under the small fruit.

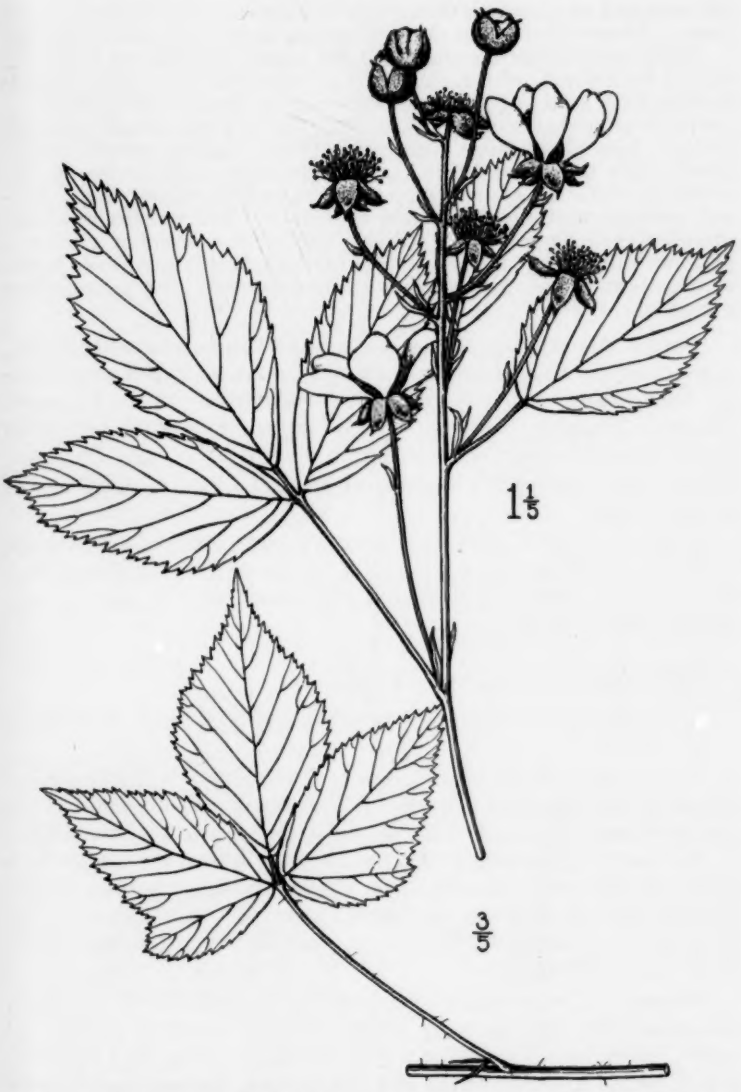
West Virginia: Terra Alta, Preston County, *E. S. Steele 94*, collected in 1924, seventeen sheets in herbarium; also *Steele 161*, collected in 1923 south of railroad east, Terra Alta, five sheets in herbarium.

This species has resemblance to *R. electus* but a stouter plant, armature stiffer and more abundant, leaflets more obovate and larger and more definitely pointed, serratures more acute, flower-clusters distinctly racemose and the pedicels divaricate in fruit. It may also be compared with *R. notatus*, but that is a smaller and more tenuous plant with more acuminate dentate or notched leaflets, softer more hispid armature, pedicels much more hispid-glandular, flowers and fruits usually not standing much beyond the foliage, clusters mostly cymiform.

Rubus quebecensis, spec. nov. Fig. 78.

Humilis, diffusus, 50 cm. plus vel minus altus; axis primocani nudus vel sparse aciculatus, eglandulosus: folia primocani 3-foliolata, glabra; foliola ovata vel elliptico-ovata, plerumque acuminata, serrata, 7–9 cm. longa: floricani foliola 3, sæpe angustiora: inflorescentia plus vel minus racemiformis; flores 8–12, circa 2 cm. diam.; petala obtusa, contigua; pedicelli pubescentes, plerumque eglandulosi; calyx eglandulosus.

Low upright plant, either unarmed or with few scattered hispid aciculæ



78. RUBUS QUEBECENSIS. Almost herbaceous plant in southwestern Quebec, axis not glandular, leaflets acute to acuminate, clusters open and not much if at all exceeding the leafage.

on canes and no glands; leaflets ovate to elliptic-ovate, mostly 3, closely serrate; flowers few in short clusters that nearly or quite equal the foliage.

Plant semi-herbaceous or at least not woody, upright and branching, 50 cm. or less tall, with a smooth look; primocane axis either nude or bearing small scattered hispid pricklets and no glands: leaflets usually 3, ovate or somewhat narrower, 5–6 cm. long, 3–4 cm. broad, gradually pointed, base of the main ones rather broad, margins acutely serrate; petiole nude or bearing a few spicules: floricanes more or less curved, mostly 4–5 dm. high, nude or sparsely hispid; leaflets ovate to elliptic, acute and perhaps markedly acuminate or some of them practically obtuse, sharply serrate: flowers 3–9 in terminal small clusters standing about on a plane with the leaves; pedicels nude but pubescent or in some cases hispid; corolla about 15 mm. across; calyx lightly pubescent, lobes acute but not prolonged.

Southwestern Quebec: rivages sablonneux d'Ottawa, Comté de Pontiac, *Marie-Victorin, Rolland-Germain, Emile Jacques 46360*; Bellerive, Comté de Beauharnois, *Marie-Victorin, Rolland-Germain 46323*; Longueuil, Comté de Chambly, lieux secs, *Marie-Victorin, Rolland-Germain 46306* (type); Saint-Georges, Comté de Beauce, rivages de la rivière Chandière, *Marie-Victorin, Rolland-Germain, René Meilleur 46326*; all distributed as *R. vermontanus*.

Keying near to *R. electus* but a more upright plant, less woody and much less armed and axis not glandular, serratures finer and sharper, leaflets attenuate, petioles and pedicels not glandiferous. It may run into mildly glandular forms.

Rubus regionalis, stat. nov. Fig. 79.

R. junceus, Blanchard, var. *regionalis*, Bailey, in Gent. Herb. ii, 359 (1932).

As we come to understand *R. junceus* of northern New England we are able to see that the plant of northern Wisconsin heretofore treated as var. *regionalis* cannot be kept with the species; in 1941 I had stated (Gent. Herb. v, 164) that it is "probably a separate species." Type of the new species is *Fuller 700* collected at Meadowbrook, Sawyer County, Wisconsin, in 1925, "procumbent to ascending, no tipping observed." A collection at Elk Mound, Dunn County, Wisconsin, in 1930, *Fuller 3864*, cited dubiously by me in 1941, is *R. stipulatus*.

Stature of *R. regionalis* is apparently stouter than that of *R. junceus*, primocane stiff and distinctly glandular-hairy, armature shorter and stiffer; leaflets ovate and less narrowly attenuate, 7–8 cm. long and 5 cm. broad; petiole unevenly hispid and glandiferous; floricane leaflets below the flower-cluster, distinctly broader; pedicels and calyx prominently hispid-hairy and more or less glandiferous.

79. RUBUS REGIONALIS. Northern Wisconsin. Primocane glandular-hairy, leaflets more or less acuminate, cluster narrow and equalling or exceeding the leafage.

Rubus stipulatus, spec. nov. Fig. 80.

Humilis, arcuatus, ramosus, validus, 1 m. altus, stipulis dentatis 2–4 cm. longis in primocanis; axes paucis vel sparsis pilis hispidis, non glandulares: folia 5-foliolata, glabra supra et subter; foliola ovata, 6–8 cm. longa, breviacuminata vel longo-acuminata, valde duplo-serrata: folia floricanorum 3-foliolata, foliola elliptico-ovata, inciso-dentata vel lacerata: flores circa 2 cm. diam., nonnulli vel multi in laxis inflorescentiis parce folia excedentibus.

Stout even though low bush with recurving floricanes, more or less hispid primocanes, prominently large and notched stipules (whence the name *stipulatus*), large glabrous leaves, flowers several to many in loose clusters exceeding the foliage, the slender pedicels sometimes bearing a few glands.

Branching leafy plant perhaps 1 m. high; primocanes erect, stout, the nodes marked by erect stipules borne on base of petiole 2–4 cm. long and more or less notched or dentate, axis with few or scattered hispid and not prickly hairs and apparently not glandiferous: leaves of primocanes large, 5-foliolate, glabrous on both surfaces and stoutly side-ribbed underneath; leaflets ovate, the middle one 6–8 cm. long and 4–6 cm. broad, tapered to a short or long point, base broad or narrow, margins strongly double-serrate, petiole nearly unarmed to sparsely hispid: floricanes bending or overarching, axis nude or carrying a few spicules but mostly appearing nude; leaflets 3 or at flower-cluster sometimes reduced to 1, elliptic-ovate, coarsely mostly cut-toothed or jagged, the largest ones 6–8 cm. long: flowers several to many on slender pedicels that in some cases bear a few inconspicuous glands at the top, arranged in open racemiform often compound clusters that mostly exceed the leaves; corolla small to medium size, to perhaps 2 cm. across; calyx-lobes not prolonged, divaricate or reflexing under the small fruit.

Western Wisconsin: near Big Horse Shoe Lake, Barron County, *A. M. Fuller 3816* (type); township of Elk Mound, Dunn County, eight miles east of Menomonie along margins of meadows, *Fuller 3864*.

The large peculiar primocane stipules as well as light armature, essentially glandless character and broad inflorescence, separate this species from *R. regionalis*.

Rubus Deaneanus, spec. nov. Fig. 81.

Erectus, minus quam 1 m. altus, primocani erecti, floricani postremo diffusi vel librati, axes hispido-aculeati, eglandulosi præter in pedicellis: folia primocanorum 5-foliolata, glabra supra et subter, petiolus aciculatus; foliola elliptico-lanceolata vel late elliptica, 7–9 cm. longa, 3–4 cm. lata, longo-acuminata, angustata ad basin, margines grosse serrati vel dentati: foliola floricanorum 3, late elliptica, breviter acuminata, 5–7 cm. longa: flores et fructus 6–15 in aperta ascendente racemiformi inflorescentia æquante vel excedente folia; corolla 2 cm. diam., petala obtusa: fructus in pedicellis 2–3 cm. longis, multis drupeolis pulposis.

Diffuse, branching, nearly or quite glandless, low, floricanes becoming decumbent but apparently not tip-rooting, axes prickly, primocane leaflets

80. RUBUS STIPULATUS. Named for the large stipules; note also the large open flower-cluster and the broad short-acute primocane leaflets. Western Wisconsin.

81. Rubus Deaneanus of northern New Hampshire, an upright plant but canes eventually horizontal with long narrow acuminate leaves and flowers in racemiform clusters.

long and narrow, glabrous; flowers on slender pedicels in loosely racemiform clusters below the leaves, in fruit exceeding the leaves.

Upright to nearly 1 m. but floricanes at length horizontal with erect floral shoots but probably not radicant, glandless throughout unless on pedicels; primocanes terete, armature at first stiffly hispid but becoming aculeate, the pricklets 8–15 to the cm.: leaves of primocanes 5-foliolate, firm, glabrous on both surfaces; leaflets elliptic-lanceolate to rather broadly elliptic, sometimes broadest above the middle, 7–9 cm. long, 3–4 cm. broad, long-acuminate, narrowed to base and not subcordate, margins acutely upwardly dentate or coarsely serrate, lateral blades practically sessile, petiole more or less aculeate: floricane axis retaining much armature, bearing many upright fertile shoots to 4 dm. long; leaflets much as on primocanes except smaller and perhaps relatively broader and less acuminate: flowers and fruit 6–15 on elongating pedicels that may bear few glanded hairs, the clusters covered in foliage when in bloom but exceeding the leafage in fruit, corolla 2 cm. across; calyx puberulent, probably sometimes glandiferous at base, not elongating: fruit large and pulpy.

Northern New Hampshire: Shelburne, Coös County, southeast side of Seavy brook *Deane 16, 82* (type), *83*, some of the collecting by Miss L. M. Brown, nurse to Walter Deane. Species dedicated to memory of Walter Deane, 1848–1930, diligent student of the native flora, Latin scholar, gracious friend.

Affinity of this plant is with *R. vermontanus*, but the primocane leaflets of *R. Deaneanus* are much longer and narrower and more acuminate, armature not so stiff or scratchy, floricanes more diffuse to horizontal, fruiting clusters much more open because of longer pedicels.

Rubus viridifrons, stat. et nom. nov. Fig. 82.

R. vermontanus var. *viridifolius*, Blanchard, in Amer. Bot. vii, 3 (1904), not *R. viridifolius*, Piotrowski (1930); var. *viridis*, Blanchard, l.c. and separata, not *R. viridis*, Kaltenb. (1845).

More slender plant than *R. vermontanus* with floricanes often prostrate, primocane axis distinctly and mostly closely hispid rather than acicular and without pricklets strong enough to scratch the fingers, foliage dark green and shining, leaflets narrow, thin, and very closely acutely serrate, glands abundant on canes among the hispid hairs as well as on pedicels and calyx, flower-clusters racemiform with slender ascending pedicels.

Heretofore I have had trouble with the taxonomy of this plant, in part because more than one thing has been passing under the name var. *viridifolius*, and because some of the Blanchard material apparently is confused. As collections accumulate I am obliged to take this plant out of *R. vermontanus* in order to clarify that species and to make definition possible.

Range of *R. viridifrons* is unknown to me outside Bennington and Windham counties, Vermont, York County, Maine. Other collections supposed to represent this plant are erroneously determined.

82. Rubus viridifrons. Little bramble with hispid canes, very glandular, flowers in long open racemiform bracted clusters, leaflets of primocanes narrow and acuminate. Vermont, Maine.

83. RUBUS UNIFORMIS. Erect and later recurved plant, canes hispid, acuminate leaflets, flowers in broad clusters with the foliage. Western Wisconsin.

The plant I have here in mind as *R. viridifrons* and which corresponds with authentic specimens of Blanchard, has nothing to do with *R. vermontanus*, but belongs to another group with hispid rather than aciculate or prickly canes, and it is freely glandular. The hispid character is shown in Fig. 82.

Rubus uniformis, spec. nov. Fig. 83.

Erectus recurvusque, 1 m. vel minus altus, stipulæ 2–3 cm. longæ, angustæ, non dentatæ in primocanis; axes aliquid dense hispido-hirsuti, non glandulares: folia primocanorum 5-foliolata, glabra supra, subter pubescentia; foliola ovata vel elliptica, 6–8 cm. longa, fere gradatim acuminata, minute et acute serrata: folia floricanorum 3-foliolata; foliola 5–6 cm. longa, elliptico-acuta vel anguste ovata: rami florales breves, 8–12 cm. longi; flores 7–9 vel plures in brevibus pedicellis pubescentibus in compacta inflorescentia non folia excedente.

Erect to recurving, stout, 1 m. or less tall, glandless unless on calyx and pedicels, primocane axis loosely hispid and not glandular-hairy, 5 leaflets pubescent underneath, stipules large but narrow and not notched, flowers on short pedicels in close clusters among the leaves.

Branching plant with many but not very large leaves, stipules at base of primocane petioles large, narrow, not dentate, 2–3 cm. long and often long-pointed; primocanes becoming stout, sometimes recurving, to 1 m. tall, axis glandless and rather thickly hispid-hairy: leaves of primocanes 5-foliolate, glabrous above, thinly to soft-pubescent underneath, prominently side-veined, in nature the blade not flat but with wavy or undulate edges; leaflets ovate or sometimes elliptic with greatest width at about the middle, 6–8 cm. long and 4–5 cm. broad, shortly or attenuately acuminate, base of main blades usually broad, margins finely serrate: floricanes recurving and ends sometimes nearly procumbent but not tip-rooting; leaves mostly small; leaflets 5–6 cm. long, elliptic-acute to nearly ovate or the central one narrowed to base, very acutely serrate, the upper leaves likely to be simple and lobed: floral shoots short and leafy, 8–12 cm. long; flowers 7–9 or more on short pubescent pedicels in a compact cluster somewhat overtopped by the leaves, small; calyx-lobes developing prominent point under the small fruit.

Western Wisconsin: Kinnickinnic, St. Croix County, juncture of Will Schorn and Crawford roads, *A. M. Fuller F-43-57* (type); *F-43-41*, *-42*, *-43*, *-44* in same region.

Rubus uniformis differs from *R. stipulatus* in its more closely hispid canes, more attenuate more closely serrate leaflets that are pubescent underneath, smaller floral leaflets and particularly in its condensed small flower-clusters that little if at all exceed the foliage.

Rubus singulus, spec. nov. Fig. 84.

Erectus ad 5 dm. deinde diffusus vel decumbens, acicularis, eglandulosus præter in pedicellis et calyce, foliosus: folia primocanorum 5-foliolata, glabra supra, puberulenta subter; foliola elliptico-oblonga vel obovata,

84. RUBUS SINGULUS. Erect or diffuse low sparingly prickly or setose plant on uplands of southern Vermont, very leafy, glandular only on pedicels.

acuta vel acuminata, 7 cm. longa, 3–4 cm. lata, basis angusta non cordata, grosse sed non acute serrata: floricanus sæpe libratus, folia 3-foliolata; foliola elliptico-acuta vel obovato-obtusa, 4–6 cm. longa: flores 9–15, parvi, racemiformes folia æquantes; pedicelli breves, aliquid glandulares; calyx puberulentus et glandularis.

Very leafy upright or ascending plant about .5 m. tall, hispid-aculeate, glandless unless on pedicels and calyx, leaflets elliptic-acuminate to somewhat obovate, coarsely serrate.

Attractive strong-growing bristle-berry 3–5 dm. tall, branching the second year, primocanes at first erect and then arching or diffuse; axis of primocanes terete, glandless, sparsely aculeate with sharp scratchy prickles and nearly hispid toward the apex: leaves 5-foliolate, firm in texture, glabrous and dull above, lighter colored and puberulent on under surface, petiole bearing a few spicules; leaflets elliptic-oblong, about 7 cm. long and 3–4 cm. in width, frequently broadest just above the middle, lateral ribs rather prominent, base narrow and not cordate, apex acuminate to rather abruptly acute, margins coarsely and doubly but not very acutely serrate: floricanes often or mostly horizontal with erect branches, the axis retaining some of its armature; leaves mostly 3-foliolate or sometimes lobed; leaflets elliptic and acute to obovate and obtuse, 4–6 cm. long, coarsely but not sharply serrate-dentate: flowers 9–15 in terminal racemiform clusters that little if at all exceed the foliage; pedicels short, spiculose and mostly faintly gland-bearing; corolla small, little exceeding about 1 cm. broad; calyx puberulent, glandiferous at base, the lobes short.

Southern Vermont: in clumps on old dry hills, Townshend, Windham County, *Bailey 434*.

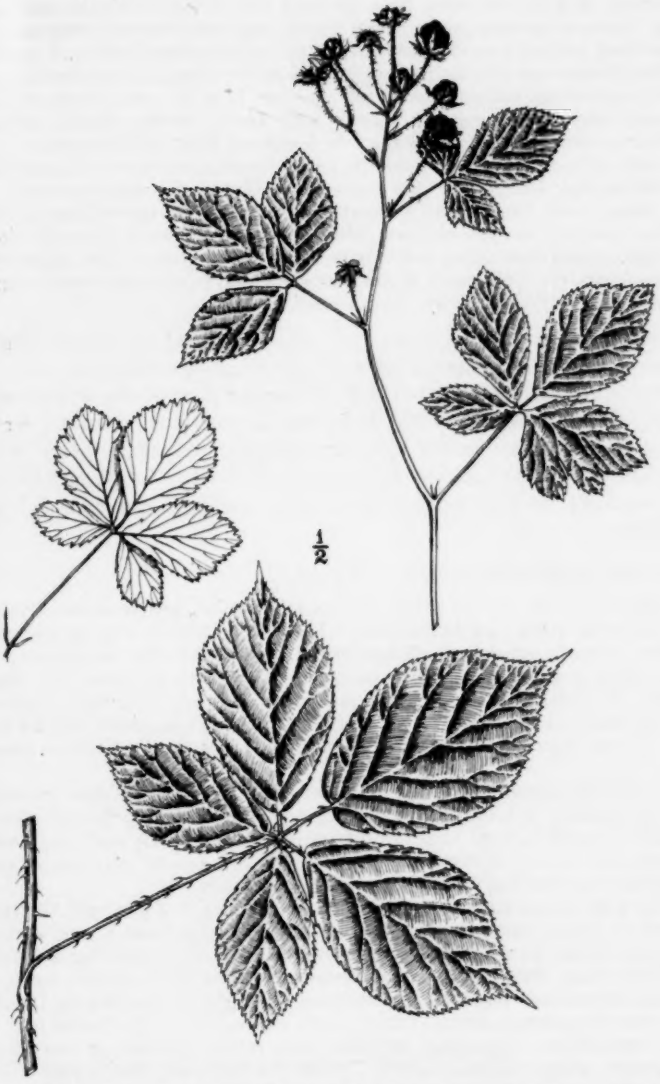
This singular plant suggests *R. apparatus*, but it has an armature very unlike it and much stouter, leaves are firmer, smaller and not soft-pubescent underneath, leaflets narrower and not expanded at the middle, less coarsely notched, flowers smaller. It cannot be associated with the weak and lank *R. junceus* which has very long-acuminate and acutely serrate leaflets and more diffuse flower-clusters.

Rubus Benneri, spec. nov. Fig. 85.

Altus, erecto-ascendens, arcuatus, pæne 2 m. altus, paucis rectis vel declinatis aculeis 5 mm. vel minus longis, non hispidus: folia primocanorum 5-foliolata, glabra supra, molli-pubescentia subter, petiolus longus et breviter armatus; foliola elliptico-acuta, interdum subcordata, stricte acute serrata, 8–9 cm. longa, 4–5 cm. lata: folia floricanorum 3–5-foliolata, molli-pubescentia subter; foliola vulgo elliptica acutaque, 5–6 cm. longa, minute serrata, nonnulla cuneato-obovata et obtusa: flores 6–12 in lata cymiformi inflorescentia super folia, pedicelli et calyx glandiferi: fructus parvi, sicci, drupeolæ paucæ.

Ascending, setose-prickly, glandless except on pedicels and calyx and some of the petioles, leaves more or less soft-pubescent underneath and elliptic-acuminate or some of them on the floricanes cuneate-obovate.

Upright to about 2 m., the parts ascending and overarching, some of the canes making long thin tips as if eventually to root; primocanes terete,



85. RUBUS BENNERI. Large upright ascending bush in southeastern Pennsylvania; leaflets broadest at middle or above, closely serrate, abruptly acute; cluster more or less cymiform just clear of the foliage. Separate leaf, left middle, from base of floral shoot.

glabrous, bearing scattered thin declined but straight prickles 3–5 mm. long: leaves 5-foliolate, glabrous on upper face, variously soft-pubescent on lower face, petiole longer than leaflets and with scattered reflexed prickles; leaflets elliptic- or oblong-acuminate and rather abruptly narrowed to the point, central one subcordate at base, 8–9 cm. long, 4–5 cm. broad, strongly parallel side-ribbed, margins closely and nearly evenly sharply serrate: floricanes slender, terete, bearing few decurved short prickles; leaves 3–5-foliolate, soft-pubescent underneath, petiole mostly unarmed but sometimes gland-bearing; leaflets for the most part elliptic and short-pointed, 5–6 cm. long, 3 cm. broad, finely serrate, some of the leaves at base of floral shoots bearing cuneate-obovate obtuse leaflets: flowers 6–12 on gland-bearing slender spreading pedicels in a cymiform cluster that stands just above the leaves: fruit small, of few drupelets; calyx-lobes not broad, acutely pointed, at length divaricate, gland-bearing.

Southeastern Pennsylvania: one mile southwest of Oxford Valley, Bucks County, in wet open thicket, *Walter M. Benner 5510.*

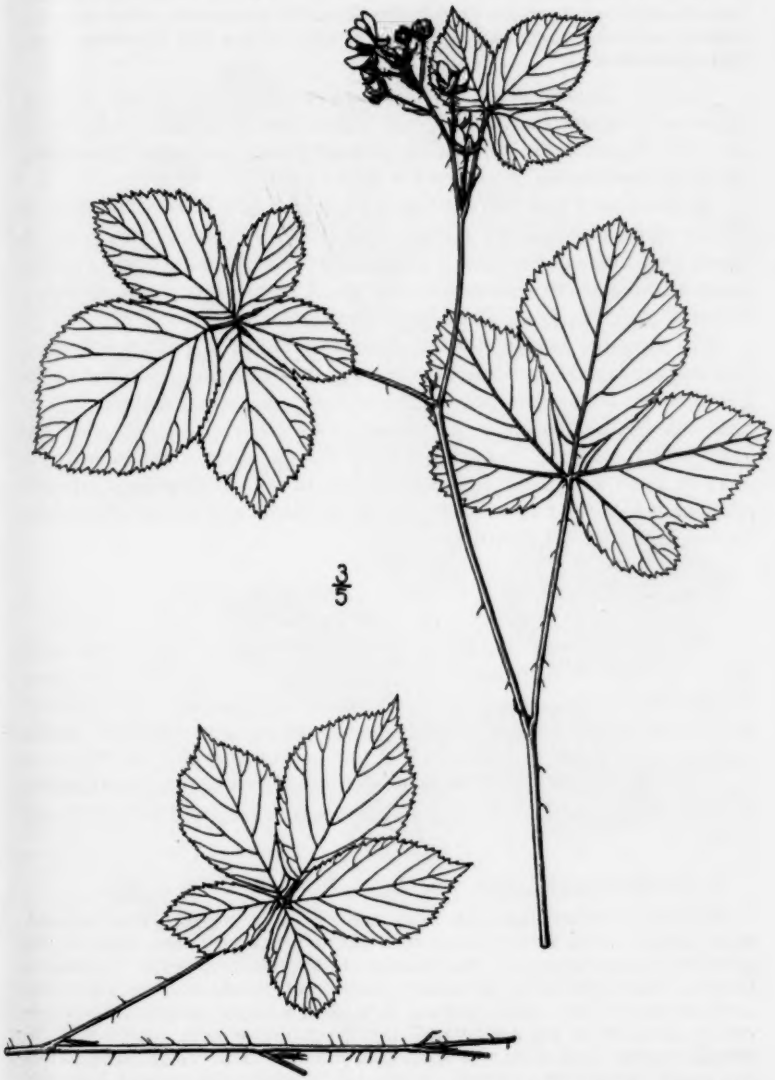
Southern representative of the New England *R. semisetosus* but a much taller and less prickly bramble, leaf-margins more closely serrate, central leaflet of primocane leaves more prevailingly subcordate, some of the floricane leaves with cuneate-obovate leaflets, flower-cluster much broader and less leafy, pedicels longer, more slender and more glandular as is also the calyx.

Rubus hispidoides, spec. nov. Fig. 86.

Ascendens, ad 65 cm.; axis primocani tenuior, sparse setosus vel ad basim pæne nudus, eglandulosus: folia mollia subter, non prominenter nervata; foliola primocani plerumque 5, ovato-acuta vel acuminata, 5–6 cm. longa, non nitida, minute serrata; foliola floricani pæne vel omino obtusa, dupliciter crenato-serrata: flores 3–8 in brevi et furcillata inflorescentia; pedicelli pubescentes, spiculati, plerumque glandiferi; corolla 8–16 vel 20 mm. diam., petala obtusa, contigua; calyx plus vel minus glandiferus.

Very weak upright few-flowered plant with thin almost hispid armature, glandless unless in inflorescence, foliage thin, pubescent; primocane leaves 5-foliolate; leaflets very broad and mostly short-pointed, teeth not sharp; flowers 2–8, at top of floral shoots, about 2 cm. across; pedicels sparsely spiculose, mostly thinly glandular; calyx glandular.

Erect in bushes and grass, or ascending, slender, 6–7 dm. tall, floricanes arched to nearly horizontal; axis of primocanes glandless, armed scantily with hispid-like bent setæ 2–3 mm. long: leaves of primocanes mostly 5-foliolate, thin, dull green, soft-pubescent underneath; leaflets ovate to elliptic, sometimes more or less obovate, abruptly acute, closely but not very sharply serrate, central one 5–7 cm. long and 3–4 cm. broad and the base more or less subcordate: floricane axes retaining some or most of the armament which becomes stiffer; floral shoots weak, leafy, axes thinly pubescent and mostly unarmed; leaflets of floricane leaves usually 3, soft-pubescent underneath, elliptic to obovate, obtuse or short-pointed, the central one two-thirds as broad as long, petiole commonly remotely armed:



86. RUBUS HISPIDOIDES. Primocane part at lower left, floricane above with irregularly racemiform cluster; leaflets broadest at middle or above. Eastern Massachusetts.

flowers few, sometimes as many as 8, in a somewhat lengthened racemiform cluster; corolla about 2 cm. or less broad at expansion, petals separate, obtuse; pedicels pubescent, spiculose, mostly with a few glandular hairs; calyx glandiferous.

Eastern Massachusetts: in moist margins of Turtle Pond in Stony Brook reservation, Boston, in dense bushes and grass and weeds, *Bailey 400, 728* (type); near Fall River, Bristol County, in moist open woods, plants semi-prostuate, *E. J. Palmer 46,987.*

At one time I had thought this plant might be a dense shade form of *R. ascendens*, which grows in that territory, but the characters are so different that I cannot now join it to that species; and I do not find a similar plant in shady parts of *ascendens* colonies. I have taken *R. hispidoides* in different places at Turtle Pond in different years.

The foregoing account (except citation of the E. J. Palmer collection) was prepared for my prodromus, 1941, and the engraving made, but at the last moment I feared to publish it and inserted a paragraph about it on page 196, Gentes Herbarum v. I cannot now unite it with *R. ascendens* and retain any respect for that species, and I return to my original conviction that we have here a self sufficient entity. In fact, it may be a question whether this novelty does not belong in the Hispidi, even though we have no record that it is a tip-rooter.

Verotriviales

The good sectional name Triviales by Rydberg in 1913 is long antedated by Mueller for another group in Europe. In its stead the name Persistentes has been proposed, but only a few of the species carry persistent leaves and *Rubus persistens* itself does not belong in the Section. In this dilemma I made the name Verotriviales (true Triviales) for the Section in 1941. All the species are of the southern United States, from southeastern Virginia to Florida and Texas. The Section is not easily confusable with any other.

Rubus Macvaughii, spec. nov. Fig. 87.

Primocani erecti, floricani valde ramosi et scandentes, axes juniores dense armati albis rectis aculeis basi plana 3–6 mm. longis setis et pilis gracilibus glandiferisque intermixtis: folia primocanorum 5-foliolata, petiolus et petioluli longi, armati et glandulares; foliola elliptica vel ovalia, brevi-acuta, 6–7 cm. longa, 3–5 cm. lata, glabra supra, subter molli-pubescentia, aculeata in costa media subter, irregulariter serrato-dentata: folia floralia parva, 3-foliolata vel simplicia, foliola ovata vel lanceolata, 2–3 cm. longa, pubescentia subter: fructus 1–3, ascendati in ramulis brevibus, circa 2 cm. longi, folia excedentes, pedicelli sparse armati, vulgo eglandulosi; calycis lobi costati, divaricati vel deflexi, fere eglandulosi.

87. RUBUS MACVAUGHII. Very prickly scrambling glandular bramble in northeastern Texas, leaflets prominently ribbed and those of primocanes short-acute, flowers and fruits few on ascending pedicels.

Stout scrambler, very prickly and glandular-hairy, with broad elliptic primocane leaflets and small narrow floricane leaflets, pedicels prickly but mostly glandless, fruit large.

Primocanes upright, floricanes much-branched and scrambling, very prickly; axis of primocanes angled, heavily armed with whitish straight broad-based prickles 3–6 mm. long interspersed with setæ and long gland-bearing hairs, these elements persisting on the floricanes: primocane leaves with long strongly armed petiole and petiolules, 5-foliolate; leaflets elliptic to oval, short-pointed, 6–7 or 8 cm. long, 3–5 cm. broad, glabrous on upper face, soft-pubescent on lower face, prominently prickly on midrib underneath, margins irregularly serrate-dentate: floricane leaves small, mostly 3-foliolate to simple, the ovate to lanceolate blades on the flowering parts glabrous above and pubescent underneath, closely serrate-dentate, 2–3 cm. long: flowers 1–3, ascendate on short lateral shoots, pedicels sparsely armed but usually not glandular: fruit short-oblong, about 2 cm. long, standing above the associated foliage; calyx-lobes ribbed, divaricate to deflexed, pubescent, usually glandless.

Northeastern Texas: one mile northeast of Latex, Panola County, in flat pine woods, *Rogers McVaugh 6794*.

Singular plant that I place provisionally in the Verotriviales. It reminds one somewhat of *R. okeechobeus* but lacks the elongated inflorescence of that species and bears a singular armature.

Rubus lassus, spec. nov. Fig. 88.

Debilis, diffusus, jacens in aliis plantis humilibus, eglandulosus, glaber nisi in calyce et in parte inferiore foliorum; primocani pæne sine aculeis cum juniores, floricani aculeis rectis 3–6 mm. longis: folia primocanorum 5-foliolata, tenuia, petioluli valde breves; foliola elliptica vel oblonga, latera plus vel minus parallela, 8–9 cm. longa, 3–4 cm. lata, breviter acuta, margines pæne obtuse serrati vel serrato-dentati: folia floricanorum 3-foliolata vel simplicia; foliola fere 3–4 cm. longa et acuta, alia cuneata et pæne obtusa: flores 1–4, in ascendatis pedicellis aculeatis folia superantibus: fructus parvi, paucis drupeolis; lobi calycis reflexi, pubescentes, acuti sed non elongati.

Slender weak plant (*lassus*, faint, languid) lopping over bushes, glandless, with ascendate pedicels from axils of short floral shoots.

Primocanes early in season erect or nearly so, later lopping, floricanes diffuse or lying on bushes and weeds perhaps tip-rooting, axes thin, sparsely prickly or the floricanes bearing straight prickles 3–6 mm. long: primocane leaves 5-foliolate, thin, glabrous except slightly hairy on veins underneath, petiole somewhat prickly, petiolules very short; leaflets elliptic to oblong with more or less parallel sides, 8–9 cm. long, about 3–4 cm. broad, briefly and not acutely pointed, margins rather bluntly serrate-dentate: floricanes often crooked from the accident or condition of growth, straight-prickly; leaves 3-foliolate to simple, small, somewhat puberulent underneath; leaflets narrowly elliptic and acute, 3–4 cm. long and less than 2 cm. broad, or those at base of floral shoots cuneate and nearly or quite obtuse: flowers 1–4, on ascendate prickly pedicels that extend beyond the associated leaf-

88. RUBUS LASSUS. Weak, lopping, glandless; leaflets narrow and not acutely pointed, those on floral shoots often broadest at or above the middle, pedicels ascendate. Texas.

age: fruit small, gobular to short-oblong, of few drupelets; calyx-lobes soon reflexed, pubescent, distinctly pointed but usually not elongated.

Northeastern Texas: four and one-half miles northeast of Marshall, Harrison County, *Rogers McVaugh 6773*, on flood-plain woods in dense shade. Affinity discussed under *R. uncus*.

Rubus uncus, spec. nov. Fig. 89.

Gracilis, prostratus, probabiliter radicans, eglandulosus, valde armati in omnibus axibus: folia primocanorum firma, glabra supra, leviter pubescentia subter, 5-foliolata; foliola longo-elliptica, vulgo longo-acuta sed interdum pæne obtusa, 8 cm. longa, 3–4 cm. lata, acute duplo-serrata: folia floralia vulgo 3-foliolata; foliola valde angusta, sæpe pæne lanceolata, 3–4 cm. longa, fere minus quam 2 cm. lata, grosse serrata: flores 3–4 in longis pedicellis aculeatis circa folia æquantibus; calyces divergentes vel reflexi, acuti sed non elongati.

Narrow-leaved glandless trailer, very spiny on canes, petioles and pedicels, each flower long-stalked, leaflets long and narrow.

Slender, prostrate, lopping over bushes and herbs, probably tip-rooting, without glands; primocanes terete, glabrous, bearing numerous scattered nearly straight broad-based prickles 3–5 mm. long (*uncus*, barbed): leaves 5-foliolate, firm, glabrous on upper face, more or less lightly pubescent on lower face, petiole and petiolules stout, somewhat pilose, stoutly hook-armed; leaflets long-elliptic, main ones about 8 cm. long and about 3–4 cm. broad, long-acute or on some leaves nearly blunt, aciculate on midrib underneath, acutely double-serrate; floral leaflets 3-foliolate or simple, blades very narrow, 3–4 cm. long and usually less than 2 cm. broad, often nearly lanceolate: flowers 3–5, about equalling the leafage, on very prickly pedicels; calyces soon divergent or reflexed, pubescent, acute but not elongated.

Eastern Texas: roadside bank six miles south of Buna, Jasper County, *Rogers McVaugh 6867*.

This species and *R. lassus* probably belong in the *R. apogæus* complex, a group that extends from Alabama to eastern Louisiana and which may be represented in modified forms in eastern Texas by McVaugh collections in the Hortorium Rubus herbarium. Straight *R. apogæus* is a plant with down-bending or overarching aspect rather than a flat or long trailer, with more pronounced lateral branches, pedicels short and hardly ascendate and much less armed, primocane leaves more pubescent underneath. It will not be understood until good local collections are available. Figs. 88 and 89 at once disclose the main foliage and armature differences between *R. lassus* and *R. uncus*.

Flagellares

Not so many years ago we had only one running tip-rooting dewberry, and we did not know what it was. We had also a very few floating names,

some of which still float. Now 109 species are recognized in the group, and the present paper adds 26 more. The Section has grown up; yet in the Inserendæ (page 197) in my Rubus herbarium are a good number of nondescripts; these unplaced plants are so distinct one from another and occupy

89. RUBUS UNCUS. Glandless trailer with narrow pointed leaflets, or floral leaves (as in middle picture) sometimes almost blunt; pedicels divaricate. Texas.

so many areas in the eastern half of the continent that I cannot comfort myself by announcing them all to be hybrids.

The Sectional name Flagellares is antedated by Rydberg's Procumbentes; on page 233 of Volume v of Gentes Herbarum I explain why I cannot use the earlier name.

Other Flagellares have recently been published: *R. Akermani*, Fernald, in Rhodora, xlvii, 152, *R. hypolasius* and *R. subinnoxius* by Fernald in Rhodora, xlix, 145, 146; six by Bailey in Hanes, Flora of Kalamazoo County, Michigan, 1947, as *R. licens, R. tenuicaulis, R. potis, R. vagus, R. conabilis, R. Florenceæ.*

Rubus uniflorifer, spec. nov. Fig. 90.

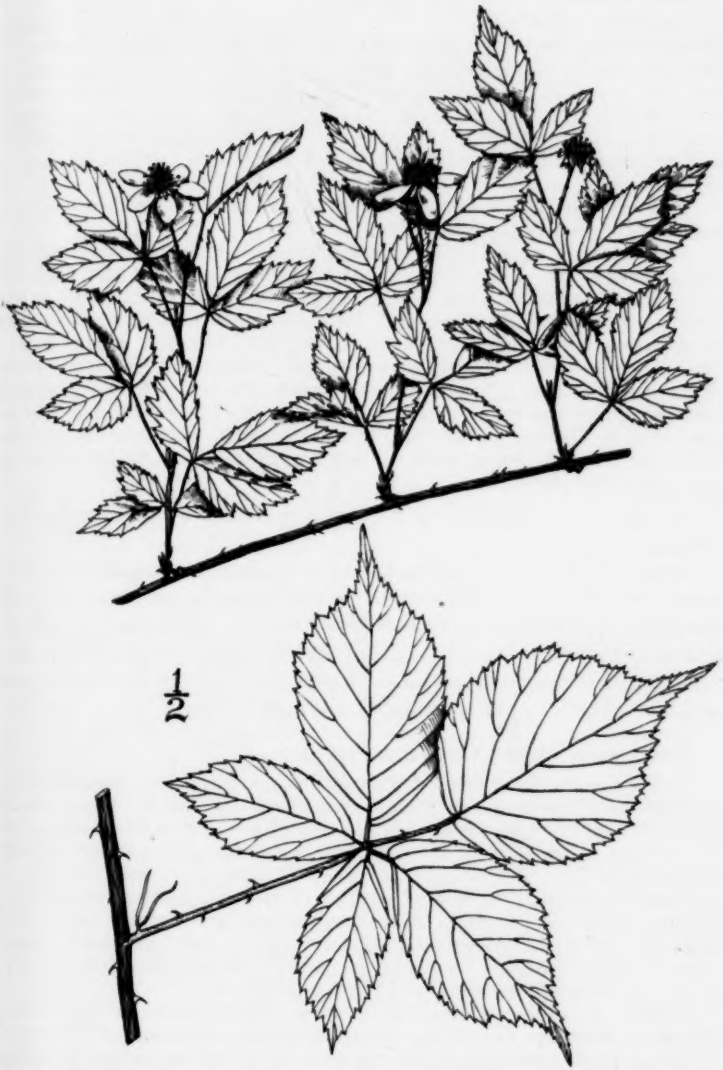
Validus, radicans, repens, eglandulosus, glaber; primocani teretes, aculei 2–3 mm. longi, curvi: folia 5-foliolata, petiolus aculeatus; foliolum terminale late ovatum, 8–10 cm. longum, circa 6 cm. latum, apex abrupte prolongatus, basis lata vel subcordata, margines dentati; foliola lateralia angustiora et fastigata ad basin: floricani teretes aculeatique; folia floralia parva, 3-foliolata; foliola angusto-elliptica, 4–5 cm. longa, 1–2 cm. lata, angusta ad basin, acuta vel pæne obtusa apice, serrato-dentata: flores solitarii in pedicellis gracilibus opertis in ramulis foliosis; corolla 2 cm. diam., petala obtusa; lobi calycis puberulenti, non elongati.

Glandless prickly trailer rooting at tips, with large broad 5-foliolate primocane leaves and small 3-foliolate floral leaves with narrow leaflets.

Large mounding glandless and essentially glabrous well-armed tip-rooting trailer; primocanes strong, terete or slightly angled, prickles 2–3 mm. long, somewhat hooked, 3 or 4 of them to 2 cm. of stem: leaves 5-foliolate on main developed canes, large, glabrous on both surfaces, petiole prickly; leaflets unlike as between the terminal and laterals, the former or central one broadly ovate and abruptly narrowed to slender point, broad or subcordate at base, 8–10 cm. long and 6 or somewhat more broad, lateral leaflets narrower and sometimes broadest at or above the middle and tapered to base, all margins notched or dentate rather than serrate but the larger teeth more or less serrate: floricanes terete, prickly; leaves on floral parts small, 3-foliolate; leaflets 4–5 cm. long, 1–2 cm. broad, narrow-elliptic, acute to nearly obtuse, more or less tapered to base, acutely serrate-dentate; flowering parcifronds with larger broader more coarsely dentate leaflets: flowers solitary on slender unarmed pedicels exceeded by the foliage; corolla 2 cm. broad, petals obtuse and separate from each other; calyx-lobes soon reflexed, puberulent, not long-pointed.

Panhandle of West Virginia: bank of Ohio River beyond Newell, Hancock County, *Bailey 310*, growing under *Rubus philadelphicus.*

Affinity of this plant is with *R. flagellaris*, distinguished by more dentate leaf-margins, narrower leaflets on main floricane laterals, flowers solitaryt In leafage it somewhat resembles *R. licens* of southwestern Michigan, bu. the one-flowered (*uniflorifer*) character at once distinguishes it as well as the broader more jagged primocane leaflets.



90. RUBUS UNIFLORIFER. Long runner; primocane leaflets ovate-pointed; floricane leaflets narrow and coarsely serrate; flowers solitary among the leaves. Panhandle of West Virginia.

Rubus eflagellaris, spec. nov. Fig. 91.

Radicans, coloniatus, 2–3 cm. longus; primocani glabri, aciculati, teretes: folia abundantia, pæne vel admodum glabra supra et subter, 5-foliolata; foliola rotundo-ovata, apice abrupto brevique, 7 cm. longa, 6 cm. lata, grosse et divaricate dentata, foliolum terminale vulgo subcordatum, petiolus aciculatus glaberque: foliola floricanorum 3, parva, oblongo-acuminata, non grosse dentata: fructus 3–5 in ascendentibus aciculatis et tenuiter glandiferis pedicellis, globosi, 15 mm. diam., drupeolæ magnæ; calyces reflexi, pubescentes, plus vel minus glandulares.

Mounding sparingly glandular prickly plant with very broad almost rounded abruptly pointed leaflets.

Plant trailing 2–3 m. long and in clumps or colonies; primocanes terete and glabrous, with 8–10 short curved prickles to 2 cm. of axis: leaves of primocanes abundant, 5-foliolate, glabrous, the large leaflets more or less overlapping, petiole and petiolules strongly armed and glabrous; leaflets round-ovate with an abrupt entire short point, terminal leaflet about 7 cm. long and 6 cm. broad, mostly subcordate at base, margins coarsely and divaricately toothed; floricane leaves much smaller, 3-foliolate, leaflets oblong-pointed and rather closely serrate-dentate: flowers and fruit 3–5 on ascending or forking prickly and sparingly thinly glandiferous pedicels: fruit pulpy, about 15 mm. thick, drupelets large; calyces reflexed, pubescent and sometimes glandular.

Connecticut: on open sandy plain at Southington in southern Hartford County, *Bailey 12.*

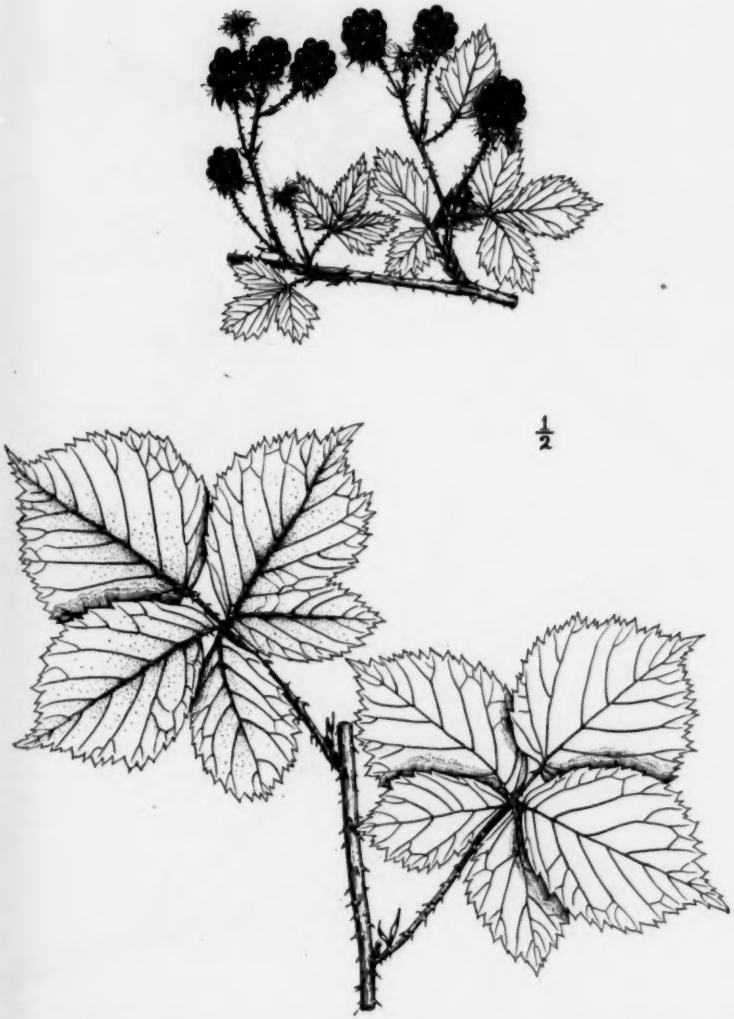
Supposed at first to be *R. flagellaris,* but leaflets on primocanes much too broad and too abruptly pointed, subcordate, dentation coarser and more spreading; fruit-cluster more forked and upper pedicels shorter, pedicels and calyx bearing a few slender gland-bearing hairs; probably to be keyed with the *flagellaris* group rather than with the glandiferous section (page 242, Gent. Herb. v) but to be mentioned in the latter.

Rubus setospinosus, spec. nov. Fig. 92.

Validus, 1 m. altus, floricani recurvi vel procumbentes, eglandulosi, ut videtur non repentes nec radicantes; axis primocanorum pæne teres, aculei multi, debiles et recti, circa 3–4 mm. longi, setis brevioribus intermixti: folia magna, 5-foliolata, glabra supra, plus vel minus glabra subter, petiolus aculeatus; foliola ovata vel elliptica, 8–10 cm. longa, 5–7 cm. lata, abrupte acuminata, margines valde duplo-serrati vel dentati: floricani seto-spinosi; folia 3-foliolata vel simplicia, pæne vel admodum lanceolata, 3–5 cm. longa, acuta vel attenuata: flores 6–8 inter folia angusta apice ligneorum ramulorum floralium, pedicelli breves præter in axillis inferioribus: fructus parvi, rotundati, drupeolæ paucæ; lobi calycis anguste acuti.

Strong seto-spinose plant with erect primocanes and procumbent floricanes, glandless, flowers few among the leaves on end of floral shoots.

Stout plant and apparently vigorous, with odd armature, glandless; primocanes erect, about 1 m. tall and 1 cm. thick, nearly terete, with many weak straight prickles 3–4 mm. long interspersed with shorter prickle-like setæ: leaves large, glabrous on upper face, more or less pubescent on under



91. RUBUS EFLAGELLARIS. Leaflets so broad and so short-pointed as not to be *R. flagellaris*, and pedicels too short and calyx glandular. Connecticut.

92. Rubus setospinosus in western Wisconsin. Vigorous glandless plant; canes with mixed armature, primocane leaflets very broad and abruptly pointed; clusters leafy.

93. RUBUS POLYBOTRYS. Tip-rooting trailer with many short clusters and very broad primocane leaflets; armature scant. Western Wisconsin.

face, 5-foliolate, petiole stout and bearing declined prickles; leaflets large, ovate, 8–10 cm. long, 5–7 cm. broad, terminal or central one truncate to subcordate at base, abruptly pointed, margins strongly doubly serrate to dentate: floricanes maintaining armature; leaves 3-foliolate to simple; leaflets (except those at base of floral shoots) nearly or quite lanceolate, 3–5 cm. long, mostly attenuate-pointed, sharply serrate-dentate, more or less pubescent underneath: flowers 6–8 among the narrow leaves at top of flowering shoots, pedicels short or those in lower axils often 3 cm. long: fruit small, rounded, of few drupelets; calyx-lobes divaricate or reflexed, long and narrowly pointed.

Western Wisconsin: Kinnickinnic, St. Croix County, *A. M. Fuller F-43-71*, Will Schorn road, on steep gravel bank, floricane procumbent but not trailing.

This unrelated plant looks something like *R. tetricus* except for the very different canes and armature and the leafy rather than ascendate inflorescence. In fact, we may place it in the Arguti when we know it better, in which case it might be associated with the *R. Rossbergianus* group.

Rubus polybotrys, spec. nov. Fig. 93.

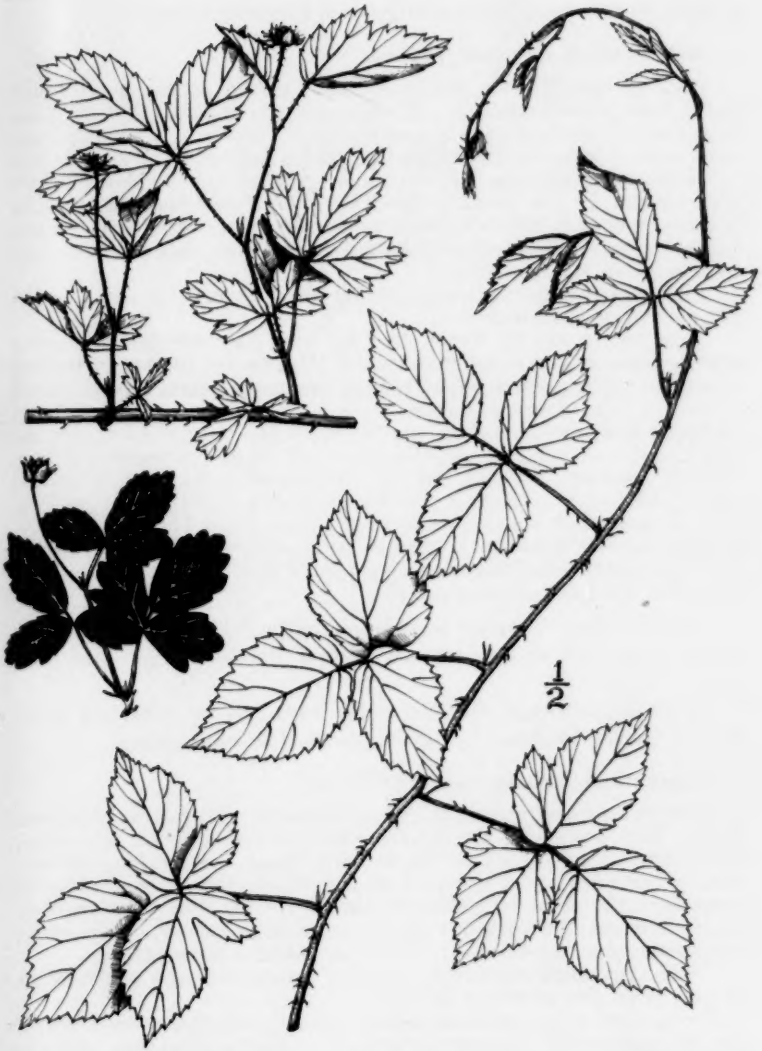
Validus repens, pæne nudus, eglandulosus, glaber, primocani 2–3 m. longi: folia primocanorum magna, tenuia, 3–5-foliolata; stipulæ valde angustæ sed prominentes; foliola ovata, acuta, 7–8 cm. longa, 4–5 cm. lata, margines acute grosse dentati: folia floricanorum 3-foliolata vel interdum simplicia in inflorescentia; foliola elliptica vel cuneato-elliptica, 5–6 cm. longa vel sæpe 1–2 cm. longa, irregulariter dentata vel pæne laciniata: flores 3–5 in ascendatis pedicellis æquantibus vel superantibus folia fere aggregatis ad nodos; corolla circa 3 cm. diam., petala longa et distincta; lobi calycis acuti sed non elongati.

Vigorous glandless tip-rooting trailer with abundant flowers in crowded ascendate clusters, fruits well above the foliage.

Canes decumbent, terete, to 3 m. long, nude or possessed of very few scattered pricklets about 1 mm. long: primocane leaves ample, thin, glabrous or only traces of short hairs under a lens, bright green, 3–5-foliolate, petiole slender and with few weak pricklets, stipules very narrow but long and prominent; leaflets ovate, acute, not cordate, 7–8 cm. long, 4–5 cm. broad, more or less overlapping, margins acutely dentate and the teeth somewhat serrate: floricane leaves 3-foliolate or perhaps simple in the inflorescence; leaflets elliptic or cuneate-elliptic, 5–6 cm. long except in the flower-cluster where they may be only 2 cm. or less long, irregularly dentate and cut: flowers 3–5 on ascendate pedicels somewhat surpassing the leaves, usually more than one cluster at a node giving the plant a multiple look (whence *poly, botrys,* many clusters); corolla about 3 cm. across, the petals long and separate; calyx-lobes acute but not elongated.

Western Wisconsin: Kinnickinnic, St. Croix County, *A. M. Fuller F-43-20*, on wooded bank in sandy soil, primocane erect at first, then recurving, finally trailing and tip-rooting.

This plant may be contrasted with *R. Maltei* by its much broader



94. RUBUS SAILORI. Glandless trailer with solitary flowers on long pedicels, floral leaflets notched. High lands of western West Virginia.

leaflets that are more broadly dentate and cut and much more abruptly pointed, flowers numerous in contiguous or glomerated clusters.

Rubus Sailori, spec. nov. Fig. 94.

Gracilis, eglandulosus, radicans, pæne glaber, repens, axes armati uncis: folia primocanorum 3–5-foliolata, petiolus armatus; foliolum terminale ovatum, abrupte acutum, leviter subcordatum basi, 5–6 cm. longum, circa 4 cm. latum, margines dentati: floricani teretes, valde armati; folia 3-foliolata vel 1-foliolata, petiolus sparse armatus; foliola oblonga vel aliquid cuneata, 3–5 cm. longa, 2 cm. vel minus lata, apex pæne vel admodum obtusus, margines stricte dentati vel serrati: flores solitarii in ramulis lateralibus foliosis folia æquantibus vel superantibus; calyx circa 15 mm. in expansione, lobi non extenti.

Tip-rooting glandless trailer distinguished by narrow more or less obtuse dentate floral leaflets.

Long runner and tip-rooter, to 3 m. long, glandless, glabrous unless slightly pubescent on veins on under side of leaves and perhaps on pedicels as well as calyx; prickles 2–3 mm. long, becoming stout and hooked, 5–8 of them to 2 cm. of axis: primocane leaves 3–5-foliolate, essentially glabrous on upper face, petiole armed, stipules small and very slender; terminal leaflet ovate, 5–6 cm. long, about 4 cm. broad, slightly subcordate at base, abruptly pointed, margins dentate; floricanes terete, stoutly armed; leaves 3-foliolate or 1-foliolate, petiole sparsely armed; leaflets 3–5 cm. long, 2 cm. or less broad, oblong to somewhat cuneate, apex blunt or nearly so, margins coarsely dentate or notched: flowers solitary on short leafy laterals and equalling or exceeding the foliage; calyx about 15 mm. across at full expansion, the lobes not long-pointed.

Western West Virginia: high lands above Milton, Cabell County, *Samuel Sailor 346*, on bare exposed bank; a sparsely foliaged plant lying close on the ground.

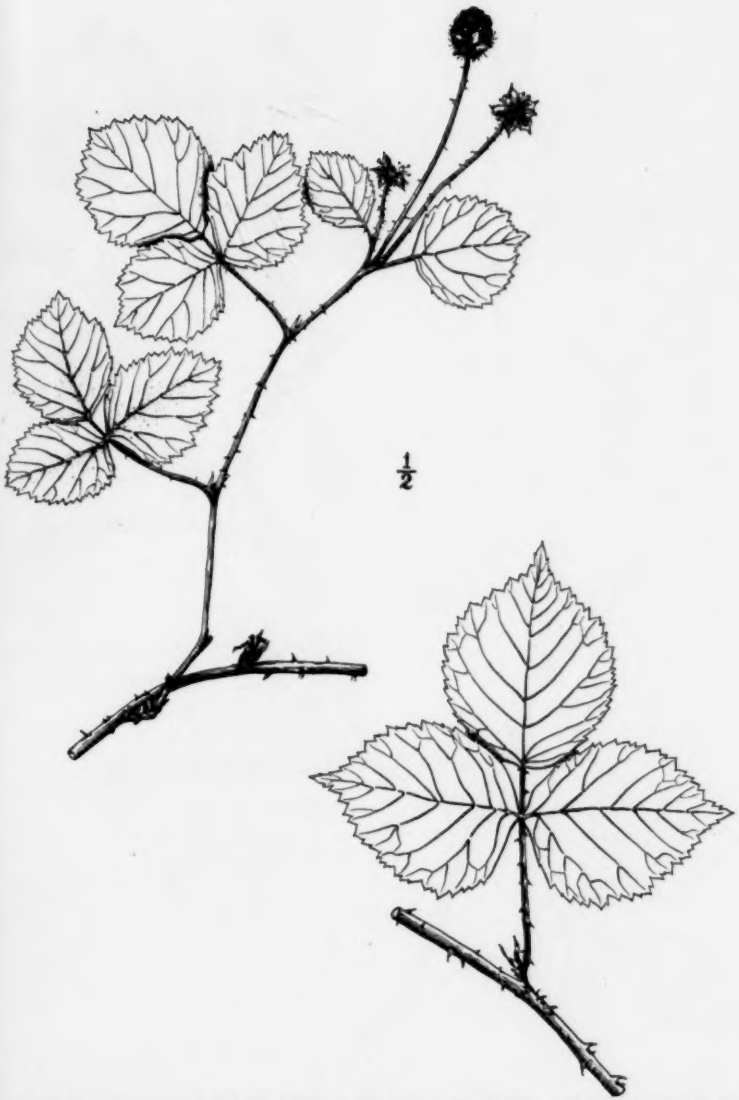
Its kinship is with *R. cordialis* and *R. connixus*, but is at once distinguished from all congeners by its blunt notched floricane leaflets.

Rubus maniseesensis, spec. nov. Fig. 95.

Repens, radicans, prostratus, glaber, aculeatus, eglandulosus: primocani teretes; folia 3-foliolata, petioli validis curvis aciculis; foliola lato-ovata, valde brevi-acuminata vel obtusa, 6–7 cm. longa, 5–6 cm. lata, vix subcordata, margines late et apiculate dentati: foliola floricanorum ovalia vel pæne circularia, pæne vel admodum obtusa: fructus circa 3, in longis ascendentibus pæne vel admodum glabris pedicellis, globulares, 15 mm. diam., drupeolæ magnæ; calyces divaricati vel ascendentes, pubescentes.

Profuse branching tip-rooting glandless trailer with very broad leaflets and 1–3 flowers on ascending pedicels.

Procumbent with stout long glabrous canes bearing many small mostly straight prickles and tip-rooting, axis terete: leaves 3-foliolate, glabrous both surfaces, petiole with small somewhat curved prickles; leaflets broad-ovate, short-pointed to obtuse, 6–7 cm. long, 5–6 cm. broad, base hardly subcordate, margins dentate with broad not very large apiculate teeth;



95. RUBUS MANISEESENSIS. Tip-rooting glandless trailer with main leaves 3-foliolate; leaflets very broad and abruptly acute; flowers few, ascendate. Rhode Island.

96. RUBUS CURRULIS. Mounding long trailer, canes nearly nude; leaflets narrowly ovate-pointed, occasionally 4-foliolate; flowers briefly ascendate at or exceeding the leaf level. Wisconsin.

97. RUBUS EXEMPTUS. Species previously described but not pictured; stoutly armed, leaflets prominently pointed, flowers semi-ascendate with the upper leaves. Kentucky.
See page 272.

floricane leaflets oval to nearly circular in outline, most of them obtuse or with only a little brief point, rather closely serrate-dentate: fruits and flowers about 3, on long ascending nearly or quite glabrous pedicels that mostly exceed the foliage; berries gobular, about 15 mm. thick, drupelets pulpy; calyces spreading or ascending, pointed, pubescent, glandless.

Rhode Island: sandy land on north side of Mohican Trail near southeast lighthouse, Block Island (Manisees Island), Newport County, *K. P. Jansson 47* of 1938.

This species keys well perhaps near *R. Jaysmithii*, distinguished by its 3-foliolate more regular or uniform primocane foliage, broader nearly or quite obtuse floricane leaflets, stronger armature.

Rubus currulis, spec. nov. Fig. 96.

Repens, radicans, eglandulosus, glaber præter sub folia, axes nudi vel sparse aculeati, folia parva: folia primocanorum vulgo 3-foliolata, petiolus et petioluli tantum sparse et breviter aculeati; foliola plus vel minus elliptica, 3–5 cm. longa, 2–3 cm. lata, obtusa vel aliquid acuta, duple serrata et dentata: folia floricanorum 3-foliolata vel simplicia; foliola partium floralium fere non 2 cm. longa, ovata vel elliptica, grosse serrata: flores 4–8 in ramo florali, pedicelli simplices vel furcati, æquantes vel superantes folia: fructus pæne globulares, drupeolæ paucæ; lobi calycis griseo-pubescentes, non elongati.

Tip-rooting glandless plant, leaflets irregularly elliptic and small, flowers few on nearly nude relatively short pedicels or the pedicels forked, usually equalling or somewhat exceeding the foliage.

Long-trailing, to 2–3 m., making upright curving nearly nude primocanes with small leaves 3-foliolate or sometimes 4-foliolate, glabrous on upper face, minutely pubescent underneath, petioles and petiolules only sparsely and briefly aculeate; leaflets more or less elliptic, obtuse to indifferently acute, 3–5 cm. long, 2–3 cm. broad, doubly or obscurely serrate and dentate: floricanes becoming woody, terete, nude or remotely prickly; leaves 3-foliolate or simple; leaflets small, mostly under 2 cm. long in the floral parts, ovate to elliptic, coarsely serrate: flowers 4–8 on a floral shoot from leaf-axils on simple or forked thinly pubescent pedicels that more or less equal or even exceed the foliage: fruit nearly globular, of few drupelets; calyx prominent, remaining nearly erect, lobes broad and short-pointed but not elongated, gray-pubescent.

Southern central Wisconsin: Red Granite, Waushara County: *A. M. Fuller 126*, trailing over granite boulders (*currulis*, running).

This bramble evidently belongs to the *R. nefrens* group, three of which are entered in my prodromus (Gent. Herb. v), now making four. *R nefrens* is there figured; the other three are first illustrated herewith. All of them are:

A. Axes or main canes conspicuously armed with stout broad-based bent prickles. Kentucky ..... *R. exemptus*, Fig. 97.

AA. Axes or main canes not prominently or closely armed, or sometimes with only weak short remote not broad-based prickles.

B. Pedicels long, single and ascendate, usually strictly upright.
c. Main primocane leaflets evenly elliptic, gradually pointed, margins usually ciliate. Missouri.....*R. nefrens*
cc. Main or primary primocane leaflets with irregular notched or abrupt apex, margins not ciliate, upper or later leaflets short-acute. Oklahoma.....*R. neonefrens*, Figs. 98, 99.
BB. Pedicels divaricate, short or else forked: leaflets irregular in shape. Wisconsin.....*R. currulis*

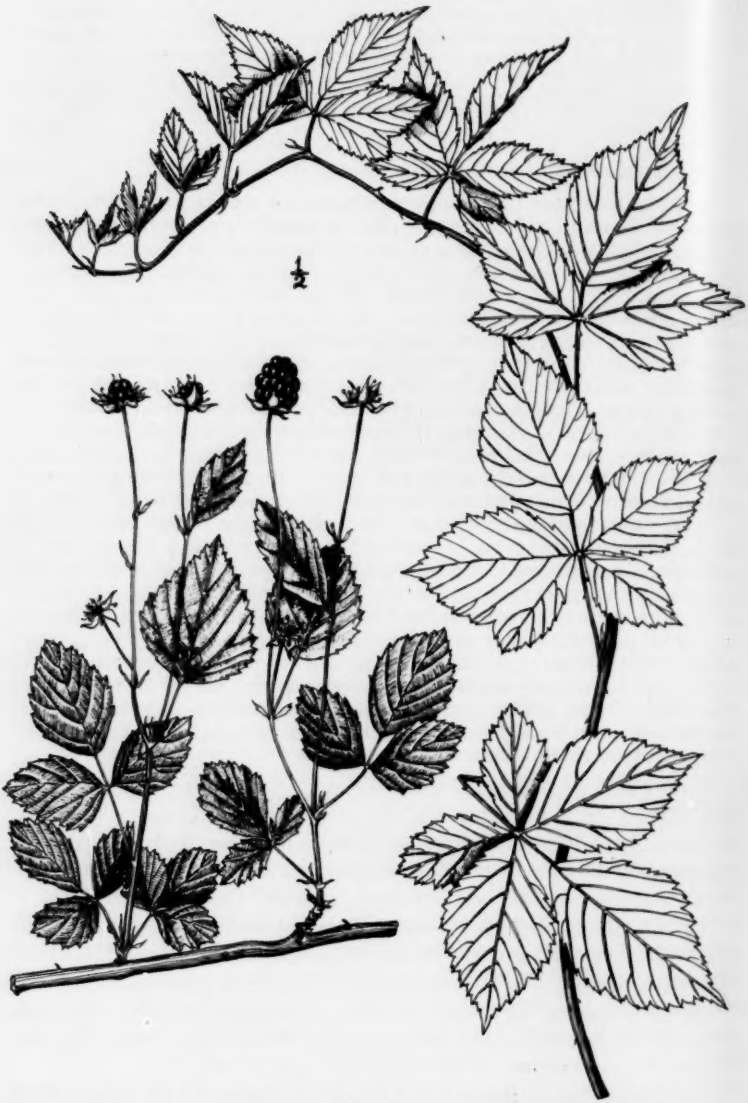
Rubus vixalacer, spec. nov. Fig. 100.

Foliosus, vigorosus, eglandulosus, procumbens, radicans, multi-ramosus; primocani teretes, glabri, sparsis aculeis uncatis 2–3 mm. longis: folia multa, 3-foliolata, glabra supra, sparse pubescentia subter in nervis, petiolus aculeatus; foliola ovata, par inferius fortasse lobatum vel divisum, basis vulgo fastigata, 7–9 cm. longa, 5–6 cm. lata, acuta, margines acute serrato-dentata: folia floricanorum 3-foliolata vel simplicia; foliola ovata vel cuneato-elliptica, 2–4 cm. longa, margines acute serrato-dentati vel pæne laciniati: flores 3–5, pedicelli ascendentes vel erecti æquantes vel superantes folia; corolla 15–20 mm. diam.; calycis lobi angusti, interdum breviter elongati: fructus parvus, drupeolæ paucæ et distinctæ.

Strong well-armed glandless trailer bearing flowers and fruits on slender erect pedicels that equal or somewhat exceed the foliage; much-branched. Leafy vigorous branchy dewberry, canes 1 m. and more long, tip-rooting; primocanes terete, glabrous, provided at intervals with hooked prickles 2–3 mm. long: leaves ample, 3-foliolate, glabrous on upper face, perhaps thinly pubescent on veins underneath, petiole carrying hooks; leaflets ovate, lower pair perhaps lobed or even divided, base usually not broad but mostly tapering, 7–9 cm. long, about 5–6 cm. broad, acute or shortly pointed, margins acutely serrate-dentate: floricane leaves 3-foliolate to simple, various in pattern, blades ovate to cuneate-elliptic, 2–4 cm. long, edges sharply serrate-dentate to almost jagged: flowers 3–5 on slender upright or erect glandless but often somewhat armed pedicels that equal or somewhat exceed the foliage; corolla 15–20 mm. across; calyx soon divaricating or at last reflexed, not heavily pubescent, lobes narrow, now and then briefly elongated: fruit small, of few distinct drupelets.

West Virginia: Strand's Creek, Webster County, *Mr. & Mrs. H. A. Davis 7361* (type), on rocky pasture near mouth of Grassy Creek, and *7406* along bank between railroad and Creek; probably *Bailey 456* at Pikeside, Berkeley County; *E. S. Steele 58* west of King wood, Terra Alta, Preston County; *Bailey 317* at Newcreek, Mineral County; *Bailey 205* at Minnora, Calhoun County, trailing on a bank; *Bailey 213*, at Pie, Mingo County, trailing and tipping. Also in Kentucky probably *Mary E. Wharton 1873* near Jeffersonville, Montgomery County, on dry sunny shaly ground; *Wharton 6113*, near West Bend, Powell County, trailing 2½–4 feet long; *Bailey 305* at Raywick, Marion County, in The Knobs, on open dry land, trailing but more or less upright in its younger growth.

The reader may be puzzled, as I am, at my hesitancy on some of these many citations. In founding *Rubus alacer* in 1943 (Gent. Herb. v, 315) I had in mind three collections, from Albemarle and Patrick counties in the



98. RUBUS NEONEFRENS. Previously described but not pictured; nearly devoid of armature; pedicels strictly ascendate; later leaflets short-acute. Oklahoma. See page 273.

uplands of Virginia and from Buncombe County in western North Carolina. I still hold to these identifications. In the meantime I have had collections from West Virginia and Kentucky that I have tentatively named *R. alacer* although I do not know that any of these identifications have appeared in print; from these later collections I now separate *R. vixalacer* and *R. injunctus*, and yet leave some of them for further study (*vixalacer*, hardly alacer; *injunctus*, not joined or united). *R. alacer* is distinguished from these novelties particularly by the inflorescence, which is of single flowers along the floricane as in lower left in Fig. 135 Gentes Herbarum v, or in twos or threes on leafy growths as in upper left in Fig. 135, both with obtuse leaflets, as contrasted with the ascendate form and acute leaflets in Fig. 100. *R. injunctus* is known by its thin regular primocane leaflets of elliptic form and close serration and well patterned ascendate inflorescence.

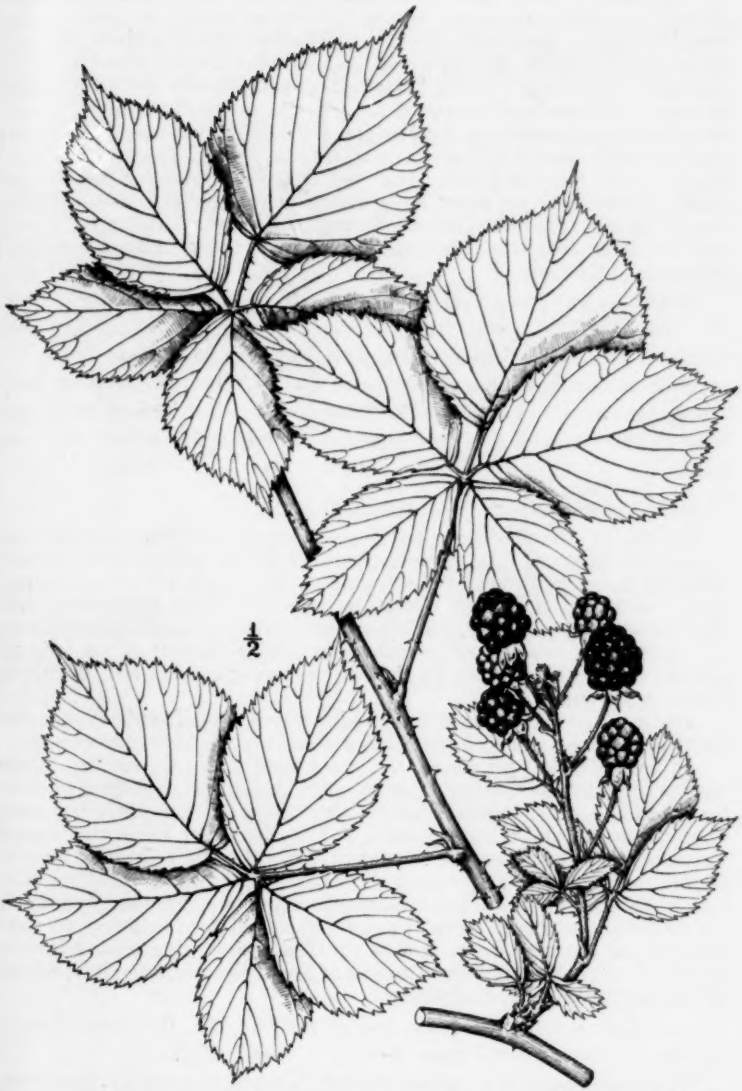
Rubus noveboracus, spec. nov. Fig. 101.

Magnus, tumularis, radicans, eglandulosus, multis stipatis foliis; primocani teretes, glabri, sparse aculeati: folia 3–7-foliolata, glabra supra, tenuiter pubescentia subter; foliola ovata vel ovato-oblonga, 7–9 cm. longa, 5–6 cm. lata, vulgo prominenter acuminata, acute et regulariter serrata: floricanorum foliola fere oblonga, acute vel pæne obtusa: flores 3–7; inflorescentia semi-racemiformis, pedicellus centralis brevis, pedicelli laterales elongati: fructus oblongi, 2 cm. longi, drupeolæ magnæ pulposæque.

Big mounder, tip-rooting, glandless, only moderately pubescent, leaflets crowded, inflorescence broad but not ascendate from different axils.

99. RUBUS NEONEFRENS. Primocane lower leaf in greater detail; about natural size.

100. RUBUS VIXALACER. West Virginia, Kentucky. Segregate from *R. alacer* because of greater number of flowers and acute leaflets, as well as growth characters and range.



101. RUBUS NOVEBORACUS. Vigorous mounding glandless tip-rooting plant with large abruptly pointed broad leaflets, flowers and fruits on leafy laterals. New York.

Vigorous radicant trailer but making dense mounds to 1 m. high; primocanes terete, glabrous, bearing very small nearly or quite straight prickles: leaves numerous, thick, 3–7-foliolate, upper surface glabrous, under surface thinly but hardly softly pubescent; leaflets ovate to ovate-oblong, 7–9 cm. long, 5–6 cm. broad, either prominently narrowly pointed or even indifferently so, margins sharply and forwardly pointed, base of terminal leaflet sometimes subcordate: floricane leaves mostly 3-foliolate and relatively small; leaflets various, mostly oblong, sharply pointed to nearly obtuse, 5–6 cm. more or less long, acutely serrate, pubescent underneath: flowers 3–7 on short leafy laterals, in a broad semi-racemiform cluster, pedicel of terminal flower short and laterals elongated: fruit oblong, to 2 cm. long, drupelets pulpy; calyces reflexed, broad and not elongated, pubescent, glandless.

South-central New York: on dry bank at Erin, Chemung County, *S. J. Smith 900, 901*, both from same colony; twenty-two sheets in herbarium. *Noveboracus*: New Yorkian, *Eboracum* Roman name for York.

Stouter and larger less prickly plant than *R. obsessus* with more finely acutely and regularly serrate primocane and floricane leaflets, more open fruit-clusters with abbreviated central pedicel, fruits larger and more pulpy.

Rubus problematicus, spec. nov. Fig. 102.

Prostratus tumularisque, ad 3 cm. longus, radicans, eglandulosus, aculei parvi et pauci: folia primocanorum 5-foliolata, glabra supra, tenuiter pubescentia subter; foliola ovato-acuta, 7–8 cm. longa, 4–5 cm. lata, acute grosse serrata, basis folioli terminalis plus vel minus subcordata; folia floricanorum fere 3-foliolata, foliola angusto-ovata vel lanceolato-ovata vel lato-lanceolata: flores 5 vel pauciores in foliosis ramulis et vix folia excedentes, pedicelli 1–2 cm. longi, non ascendati; calyces lati, divaricati, piloso-pubescentes.

Distinct looking glandless trailer with leaves not soft-pubescent underneath and flowers on short spreading pedicels in leafy cymiform clusters.

In low mounds 3 m. across, the canes trailing and tip-rooting, foliage dark in color; primocanes terete, bearing few straightish very small prickles: leaves 5-foliolate, glabrous on upper face, thinly but not softly pubescent on under face; leaflets ovate-pointed, 7–8 cm. long, 4–5 cm. broad, base of terminal leaflet more or less subcordate, margins very sharply coarsely serrate, petiole pilose and weakly armed; floricane leaflets mostly 3-foliolate, leaflets narrow-ovate to lance-ovate or lanceolate, prominently pointed, the branches having an upright aspect when mounted: clusters on short laterals that are very leafy; flowers 5 or fewer on hairy glandless bracted pedicels 1–2 cm. long, not standing free of the foliage nor ascendate; calyces spreading, broad, hairy-pubescent.

Southern-central New York: foot of Sullivan Hill, Chemung County, near park entrance in old sandy field, *S. J. Smith 2614*.

The plant suggests *R. arenicolus* but is much less prickly, primocane leaflets gradually long-pointed and more ovate, floral leaflets narrower, longer-pointed and more incisely serrate.

Rubus Pohlii, spec. nov. Fig. 103.

Procumbens, eglandulosus, pæne inermis et glaber, radicans; primocani lignei, rare aciculis 1 mm. longis: folia 3–5-foliolata, tenuia, minute pilosa in nervis subter, petiolus paucis aciculis; foliola ovata, 6–8 cm. longa, 4–5

102. RUBUS PROBLEMATICUS. Mounding tip-rooting glandless trailer, leaves pubescent underneath, leaflets very broad and short-acute, flowers few with the leaves. New York.

cm. lata, gradatim vel abrupte acuta, interdum subcordata, margines minute dentati et irregulariter serrati: folia floricanorum 3-foliolata, variis magnitudinibus formisque; foliola elliptica vel cuneato-elliptica, acuta vel obtusa, 2–5 cm. longa: flores 4–7 in brevibus et cymiformibus inflorescentiis cum foliis, pedicelli breves et divaricati; corolla 2 cm. vel minus diam., petala angusta et separata.

Attractive tip-rooting glandless trailer with flowers in close little clusters at about the leaf level, axes practically nude.

Primocanes essentially terete, branching and tip-rooting, unarmed or now and then bearing a few pricklets about 1 mm. long: leaves 3–5-foliolate, thin, glabrous or minutely pilose on veins underneath under a good lens, stipules very narrow and slim, petiole with few pricklets; leaflets ovate, sometimes subcordate at base, either gradually or abruptly pointed, 6–8 cm. long, 4–5 cm. broad, margins finely but irregularly serrate intervened with minute teeth: floricane leaves 3-foliolate; leaflets various, elliptic to cuneate-elliptic, acute or obtuse, 2–4 or 5 cm. long and usually more than one-half as broad: flowers 4–7 on short divaricate pedicels in a cymiform cluster at top of leafy laterals; corolla less than 2 cm. across, petals narrow and separate; calyx-lobes slenderly acuminate but not elongated, pubescent.

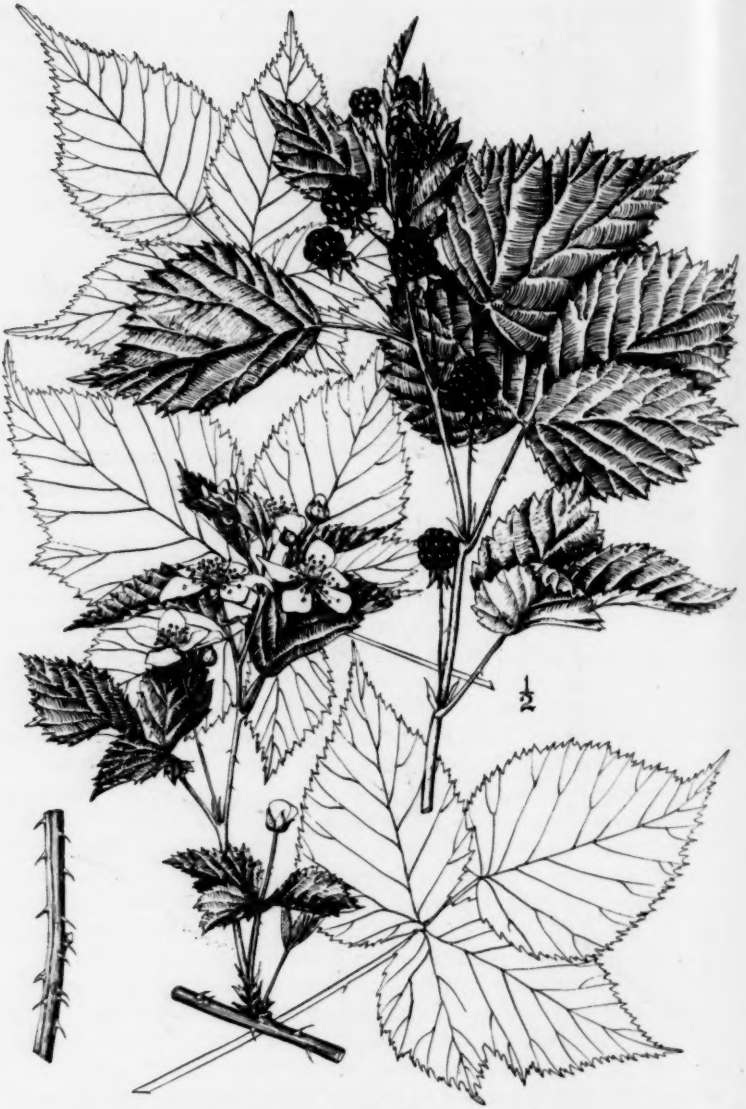
Eastern Wisconsin in Milwaukee County: Wauwatosa, *Richard Pohl 97982* (type), *97983*, *97999*, *A. M. Fuller F-42-64*; township of Milwaukee, along right-of-way north of Fairy Charm road, *Lloyd Shinners S-44-140*.

This plant has kinship with *R. minnesotanus* but is much less prickly, apparently more procumbent and trailing, leaflets more regular and finely serrate, flowers smaller in close cymiform clusters.

This is the place to comment on *Rubus minnesotanus*. When I founded the species in 1943 I knew it from five collections in Cass and Houston counties, Minnesota. A small root from the original type collection was planted in 1941 in my garden at Ithaca, New York, where it still thrives luxuriantly. I now have collections from Ramsey County, Minnesota, and in Wisconsin from St. Croix, LaCrosse, Crawford, Sauk, Waushara, Sheboygan, Washington, Ozaukee, Jefferson, Waukesha counties, as well as cultivated material from Oregon. In my original account I did not present a full illustration of the species but only a piece of primocane tip (Fig. 98, Gent. Herb. v). I am now able to point out the behavior of the species, and to illustrate it in Fig. 104.

The species *R. minnesotanus* is not a dewberry under the customary meaning of that term. In my garden the original root had covered a space ten feet long by 1946, making an attractive dense floriferous mound knee-high and more deep. It spread by means of suckers rather than by rooting tips of canes, although a decumbent primocane would now and then take root at the end; the plant is not a trailer as grown with me, but its other botanical characters probably justify its retention in the Flagellares. Last autumn I removed the colony to an area with double the space, and this

103. RUBUS POHLII. Tip-rooting and glandless, scantily armed, flowers in small close clusters about equalling the leafage, primocane leaflets large, acuminate, terminal or central one subcordate. Wisconsin.



104. Rubus minnesotanus. Commanding species spreading by suckers, in Minnesota and Wisconsin, now first fully illustrated. See page 280. It makes dense colonies two to three feet high.

105. RUBUS ROSENDAHLII. Mounding trailer, glandless, rooting at tip, with broad pointed primocane leaflets, flowers in wide clusters about equalling the foliage. Minnesota.

spring (1947) it is coming on lustily. I dug one of the horizontal roots from which a sucker came and it was $3\frac{1}{2}$ feet long. It is a commanding species, taking possession.

Rubus Rosendahlii, spec. nov. Fig. 105.

Parvus, gracilis, eglandulosus, pæne vel admodum inermis, floricani procumbentes et radicantes: folia primocanorum parva, 3-foliolata, glabra supra, leviter pubescentia subter, margines compacte acuteque serrati; foliola pæne ovata, 5–6 cm. longa, 3–4 cm. lata, breviter vel abrupte acuminata, lata et sæpe subcordata basi; folia floricanorum ovata vel lato-lanceolata, interdum obovata, 3–4 cm. longa: flores nonnulli, 1–2 cm. diam.; inflorescentia lata, non folia excedens; pedicelli graciles, nudi: fructus globulares, 1 cm. vel minus diam.

Smaller and slenderer plant than *R. minnesotanus*, much less prickly or even nude, more readily tip-rooting, floriferous and fruitful, primocane leaves mostly 3-foliolate and less soft-pubescent underneath and central or terminal leaflet less cordate-ovate, margins much more closely and finely serrate, flowers much smaller and on shorter pedicels, fruit one-third the size and with few drupelets lightly cohering.

Branching glandless mounder and trailer, primocames erect or ascending to 4 or 5 dm., floricanes depessed or arching and some of them trailing and freely rooting at tip; prickles very few, weak and somewhat recurved or even in some cases wanting: primocane leaves prevailingly 3-foliolate, small, glabrous on upper face, lightly pubescent underneath, petiole slender and nearly or quite unarmed, margins closely sharply serrate; leaflets more or less ovate, 5–6 cm. long, about 4 cm. broad, rather abruptly and often shortly acuminate, rather broad and often subcordate at base; floricane leaflets small, ovate to broad-lanceolate and the central one often obovate or long-narrowed to base and nearly obtuse, many or most of them long-acute, 3–4 cm. long: flowers several in many clusters that are commonly about as broad as long and mostly not exceeding the foliage, pedicels slender and unarmed, corolla 1–2 cm. across, calyx-lobes small and acute and not prolonged: fruits numerous, essentially gobular, loosely shaped, 1 cm. or less diam.

Southeastern Minnesota: by Snail Lake, Ramsey County, in a small sand pit, *C. O. Rosendahl, 7604* (type) collected in June, *15881* collected in July.

Rubus onustus, spec. nov. Fig. 106.

Arcuatus sed prostratus, radicans, eglandulosus, valde fructuosus; primocani teretes, glabri, remote brevi-aculeati: folia 5-foliolata, magna, tenuia, glabra supra, subter leviter pubescentia, stipulæ petiolares gracilesque; foliola ovato-acuminata, 9–12 cm. longa, 7 cm. lata, subcordata, foliola lateralia angusta et constricta basi, margines irregulariter serrato-dentati: foliola floricanorum longo-fastigata ad basin ex apice rotundato, folia simplicia angusta et vulgo acuminata: flores 3–6 in erectis pedicellis hirsutis, in aliquid racemiformi inflorescentia, aliquanto folia excedente: fructus globosi, parvi, drupeolæ paucæ, magnæ et distinctæ.

106. RUBUS ONUSTUS. Tip-rooting glandless runner, primocane leaflets attenuate and pubescent underneath, floral leaflets cuneate, clusters mostly surpassing the foliage, fruit abundant. Northeastern New York.

Overarching and tip-rooting, branching, glandless, leaves thin, lightly pubescent underneath; flower-clusters narrow and exceeding foliage; very productive (whence *onustus*, laden).

Runner, radicant, parts nearly or quite 1 m. long; primocanes terete, remotely furnished with short straight prickles, glabrous: leaves 5-foliolate, large and thin, glabrous on upper face, thinly pubescent underneath, narrow stipules borne on the petiole which is either nude or sparingly armed; leaflets ovate-acuminate, the terminal one 9–12 cm. long and 7 cm. broad and subcordate at base, margins irregularly serrate-dentate, other leaflets narrower and tapered to base; floricane leaflets more or less long-tapered to base from a broad obtusish apex, the simple leaves in inflorescence narrow and mostly pointed: flowers and fruits 3–6 on upright hairy pedicels that make a narrow or medium somewhat racemiform cluster more or less overtopping the accompanying foliage: fruit essentially gobular, small, of few distinct fleshy drupelets; calyces spreading, not elongated, broad, hairy-pubescent.

Northeastern New York: New Russia, Essex County, in dry thicket, *Bailey 580.*

One of the *R. recurvicaulis* associates but lacking the ribbed and plicate feature of the foliage, leaflets long-attenuate and narrower in proportion to length, not shouldered, much more pubescent underneath, clusters more pronounced above the foliage.

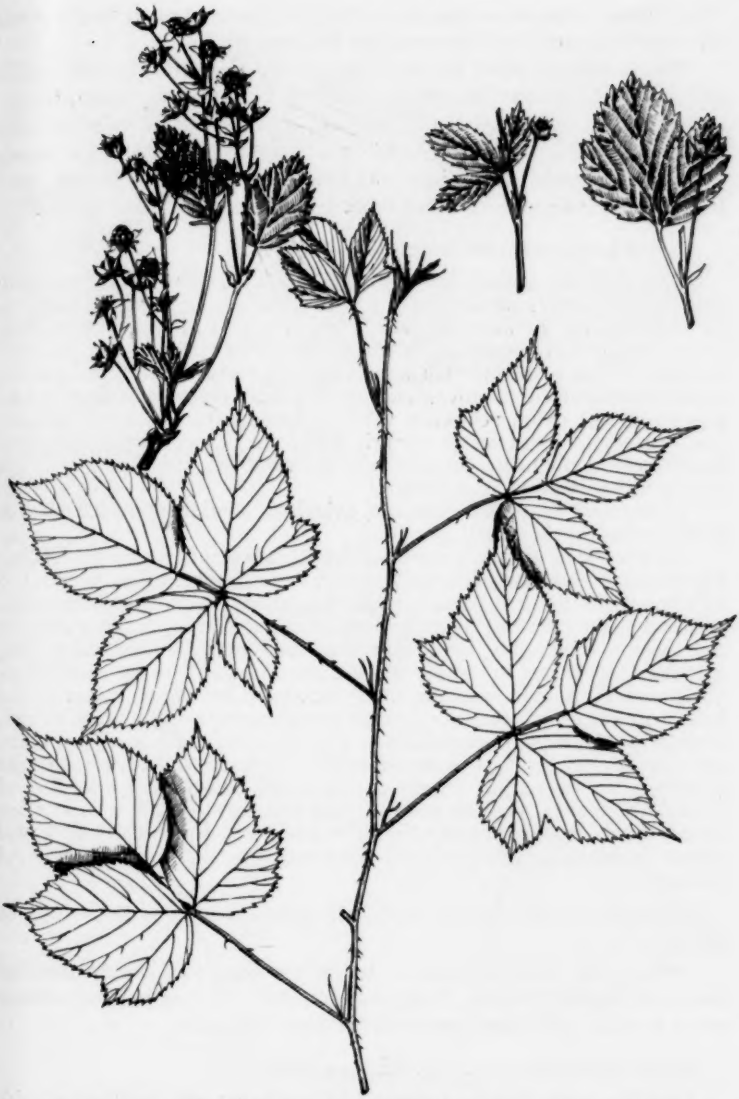
Rubus prior, spec. nov. Fig. 107.

Valde gracilis, aculæ parvæ, planta pæne eglandulosa et pæne glabra: folia primocanorum 3–5-foliolata, tenuia; foliola ovata, longo-acuta, 6–7 cm. longa, 4–5 cm. lata, rotundata vel angustata basi, margines stricte et acute serrati: foliola floricanorum parva, serrato-dentata: flores 3–6, ascendentes in angusta inflorescentia; pedicelli 2–3 cm. longi; corolla parva; calycis lobi divaricati, longo-acuti: fructus parvi, drupeolæ non succosæ.

Slender low apparently trailing and tip-rooting plant although collections are yet scant, glandless, leaves nearly glabrous underneath, flower-clusters long and usually narrow even though scarcely racemiform.

Very thin or weak, prickles numerous but very small and slender, stipules very narrow and conspicuous, without glands unless perhaps exceptionally on young growing parts: leaves of primocanes 3–5-foliolate, glabrous on upper face, nearly glabrous on under face; leaflets ovate with acuminate point, 6–7 cm. long, 4–5 cm. broad, terminal one rounded at base, petiole faintly sparsely aciculate, margins closely acutely serrate: floricane leaves various, 3-foliolate to simple, serrate-dentate: flowers 3–6 in a cluster or group, perhaps more than one group from a node, peduncle long and slender, pedicels 2–3 cm. long and ascending, all strongly ascending and making a narrow inflorescence; corolla small, petals brief and broad; calyx spreading, pubescent, the lobes with long slender point: fruit small, the drupelets apparently not succulent.

Southeastern Vermont: Townshend, Windham County, collected by William H. Blanchard in 1903. The specimens on which I base this species were in the Blanchard collections I purchased in 1918. He had ticketed it



107. RUBUS PRIOR. Weak low plant probably trailing and tip-rooting, prickles many but small, leaves small, very floriferous in narrow clusters with leaflets hardly cuneate (as seen in details upper right). Southern Vermont.

"R. villosus": that name was once applied to the common dewberry as was *R. canadensis* until its Linnæan type was seen by Bailey.

This species, *R. prior*, has much the look of *R. onustus* but the smaller and relatively broader leaves are not soft-pubescent underneath, the serration is finer, floral leaflets not cuneate, calyx-lobes more extended, fruit apparently not as well developed or as freely produced. This historic Blanchard material should have had prior attention in my papers, but I have waited (vainly) for further collections; I cannot let it lie longer.

Rubus botruosus, spec. nov. Fig. 108.

Eglandulosus, repens, 2 m. plus vel minus longus, probabiliter radicans; primocani teretes, aciculati: folia 3–5-foliolata, glabra supra, puberulenta in nervis subter, petiolus aciculatus; foliola 6–8 cm. longa, 5–6 cm. lata, ovata, lata et fortasse subcordata basi, abrupte contracta apice, margines inæqualiter acute serrati, foliola lateralia pæne sessilia: floricani graciles, nonnullas aciculas retinentes; folia 3-foliolata vel simplicia; foliola floralia 3–5 cm. longa, ovata vel ovalia vel in parte cuneata, acuta vel pæne obtusa, margines irregulariter serrati: flores 4–7 in multis brevibus latis inflorescentiis circa folia æquantibus; corolla 2 cm. vel minus lata; lobi calycis lati brevesque apice brevi.

Trailer and mounder, glandless, aciculate, bearing profusion of close short-pedicelled clusters.

Vigorous long glandless nearly glabrous creeper, probably tip-rooting; primocanes terete, with few weak straight or curved prickles: leaves 3–5-foliolate, glabrous on upper face, minutely puberulent on veins underneath, petiole aciculate; leaflets ovate, 6–8 cm. long, 5–6 cm. broad, apex abruptly narrowed to long point, broad and sometimes nearly subcordate at base, margins sharply and unequally serrate, lateral leaflets nearly sessile: floricanes slender, mostly retaining short remains of armature; leaves 3-foliolate or simple in inflorescence, petiole mostly nude; leaflets ovate to oval, sometimes partially cuneate to base, 3–5 cm. long, acute to almost blunt, glabrous above, more or less puberulent on veins underneath, margins acutely unevenly serrate: flowers 4–7 in broad clusters that little if at all exceed the leaves, pedicels more or less aciculate; corolla 2 cm. or less broad, petals narrow but obtuse; calyx-lobes broad and short with brief narrow point, puberulent; clusters many and close together (*botruosus*, full of clusters).

Southwestern New York: Woodhull, Steuben County, *Bailey 301*, on dry open bank.

Differs from *R. plicatifolius* in leaves not plicate and those of primocanes not tapered to base, floral leaflets mostly not long-pointed, clusters closer together and more numerous and more compact.

Rubus injunctus, spec. nov. Fig. 109.

Gracilis, eglandulosus, procumbens, radicans; primocani non valde lignei, teretes, aculei 1–2 mm. longi: folia tenuia, 5-foliolata, pæne glabra supra, plus vel minus molli-pubescentia subter; foliola elliptica, regularia,

108. RUBUS BOTRUOSUS. Tip-rooting glandless trailer bearing many broad clusters at short internodes. Southwestern New York.

109. Rubus injunctus. Glandless trailer with canes at first upright, long-pointed leaflets, flowers many on ascendate pedicels that surpass the leafage. Northern West Virginia.

angustata ad apicem basinque, acuta, 5 cm. longa, 3–4 cm. lata, acute serrata: folia floricanorum 3-foliolata vel simplicia; foliola elliptica vel cuneato-elliptica, 3 cm. vel minus longa, acuta vel pæne obtusa: flores 2–5; pedicelli longi gracilesque, superantes folia; corolla minus quam 2 cm. diam.; lobi calycis lati et brevi-acuti.

Slender glandless trailer, primocanes upright, plant presumably tip-rooting, leaves soft-pubescent underneath, flowers few on thin ascendate pedicels exceeding the leaves.

Canes terete, not very woody, prickles none or few and only 2 mm. long, primocanes at first upright or erect: leaves not large, thin, 5-foliolate, nearly glabrous on upper face, more or less soft-pubescent underneath, petiole and terminal petiolule slender, somewhat pilose and aculeate; leaflets elliptic and regular in shape, tapering both ways from the middle, about 5 cm. long and 3–4 cm. broad, conspicuously pointed, margins acutely serrate: floricane leaves 3-foliolate to simple, thin in texture; leaflets elliptic to cuneate-elliptic, 3 cm. or less long, acute to nearly obtuse, usually soft-pubescent underneath: flowers 2–5, not large, on long slender pedicels that extend beyond the leaves; corolla less than 2 cm. across, petals obtuse and separated; calyx with broad short-pointed lobes.

Northern West Virginia: Darnell Hollow, Monongalia County, *Mr. & Mrs. H. A. Davis 7351*, on rocky bank.

This dewberry strongly suggests *R. camurus* of the District of Columbia region, but distinguishes itself by abundant ascendate florescence and the prevailingly 5-foliolate primocane leaves and proportionately broader leaflets. See also page 275.

Rubus particularis, spec. nov. Fig. 110.

Repens, eglandulosus; primocani teretes, aculei recti 2–3 mm. longi: folia 5-foliolata, petiolus aculeatus; foliola late vel anguste ovata, supra glabra, subter molli-pubescentia, 7–9 cm. longa, 4–5 cm. lata, apex abrupte acutus, basis folioli terminalis lata, margines acute serrati: floricani graciles, aliquid armati, valde foliacei; folia 3-foliolata vel 1-foliolata; foliola elliptica vel imperfecte obovata, 5–6 cm. longa, 2–3 cm. lata, angusta basi, brevi-acuta apice: flores 1–2 in foliis finibus ramulorum foliosorum, pedicelli breves pilosique; calyx mox reflexus, pubescens: fructus oblongi, drupeolæ compactæ.

Indefinite glandless weakly armed very leafy trailer that bears only 1 or 2 flowers and fruits at a place among the leaves on foliaceous shoots.

Leafy trailer, probably rooting at tip; primocanes terete, glandless, with straight prickles 2–3 mm. long, 5 or 6 of them to 2 cm. of cane: leaves 5-foliolate, petiole armed, stipules very narrow but prominent; leaflets ovate, broader or narrower, glabrous on upper face, soft-pubescent underneath, 7–9 cm. long, 4–5 cm. broad, apex a narrow mostly abrupt point, base of terminal or central leaflet broad and sometimes nearly subcordate, margins sharply and evenly serrate: floricanes slender, somewhat armed, very leafy; leaves 3-foliolate or simple in inflorescence, glabrous above, pubescent underneath; leaflets elliptic to somewhat obovate, 5–6 cm. long, 2–3 cm. broad, narrow at base, very short-acute at apex, margins closely

110. Rubus particularis. In western West Virginia, glandless groundberry with flowers solitary among the leaves.

serrate, petiole pubescent and mostly unarmed: flowers 1 or 2 among the leaves at end of branchlets, on short pilose pedicels; calyx soon reflexed, pubescent: fruit oblong, drupelets compact.

West Virginia: near Ivydale, Clay County, *Bailey 334*, at exposed base of stone cliff.

Not closely related to any Rubus I know. Perhaps to be keyed near *R. camurus*. Forty-two sheets of Inserendæ (page 197) are in my herbarium following *R. camurus*, but none of them matches the present species.

Rubus Housei, spec. nov. Fig. 111.

Arcuatus vel ascendens, 3–5 dm. altus, decumbens vel repens, radicans, eglandulosus; axes primocanorum vix lignosi, teretes, nudi vel paucos parvos uncatosque aculeos ferentes 1–2 mm. longos: folia tenuia, 3–5-foliolata, glabra supra, breviter molli-pubescentia subter, margines acute serrati; foliola ovata vel lato-ovata, fere longo-acuta, 8–10 cm. longa, 4–7 cm. lata, foliolum centrale sæpe subcordatum: floricani graciles foliosique; folia 3-foliolata vel simplicia; foliola elliptica vel imperfecte angusto-ovata, acuta, 5–7 cm. longa, 3–4 cm. lata, foliola basalia interdum cuneato-obovata et obtusa: flores 1–2 in axillaribus pedicellis pubescentibus non æquantibus folia; corolla 2–3 cm. diam., petala lata obtusaque sed separata.

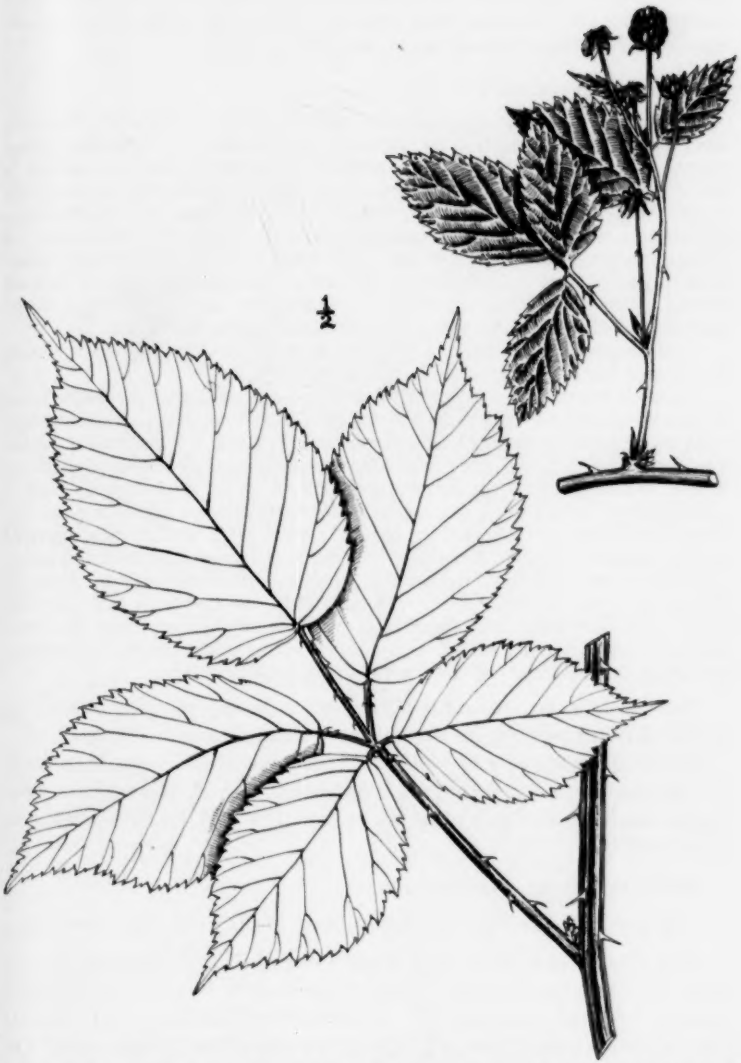
Ascending or arching, glandless, tip-rooting, leaves thin, more or less soft-pubescent underneath, flowers large and 1–3 on a shoot underneath the foliage.

Low-arching to ascending, 3–5 dm. high, decumbent or trailing, now and then tip-rooting, a soft mild plant; primocane axes not hard or very woody, terete, unarmed or bearing a few small scattered hooked prickles 1–2 mm. long: leaves 3–5-foliolate, glabrous on upper face except on veins, usually shallowly soft-pubescent on under face, margins briefly sharp-serrate and often on rounded teeth-like elevations; leaflets ovate to broad-ovate, terminal one often subcordate at base, distinctly pointed and sometimes abruptly so, 8–10 cm. long, 4–7 cm. broad, more or less nitid underneath: flowering canes slender, leafy; leaves 3-foliolate to simple; leaflets elliptic to imperfectly narrow-ovate and acute, 5–7 cm. long, 3–4 cm. broad, the basal ones sometimes cuneate-obovate and obtuse: flowers large, 2–3 cm. across, 1–3 axillary on a short slender shoot and usually covered in the foliage, pedicels pubescent; petals broad but separate, obtuse; calyx-lobes with a brief point, gray-pubescent, soon reflexed.

Southeastern New York: near Glenerie, Ulster County, in old field, *H. D. House 29785* (type). Central Pennsylvania: Centre County, on wooded grassy hillside five miles west of State College, *H. A. Wahl 1717*; among brush in dry oak barrens, one and a half miles west of State College, *Wahl 1718*; brushy place at edge of old railroad bed, one and a half miles east of Punxsutawney, Jefferson County, *Wahl 1736*; perhaps only variants of a single species.

The plant suggests *R. foliaceus*, but it is less luxurious, has thinner foliage, its leaves are less soft-pubescent underneath, more acutely serrate,

111. Rubus Housei. Low plant more or less trailing, not very woody, glandless, lightly armed, flowers only one or two on a leafy branchlet. Eastern New York, central Pennsylvania.



112. RUBUS LARGUS. Robust prickly large-leaved plant in northern Texas, arching and prostrate, primocane leaflets acuminate, flowers few on ascendate pedicels somewhat exceeding the leaves.

leaflets running larger and more decidedly pointed and those on flowering parts larger and broader, basal leaflets of flowering parts often cuneate-obovate and obtuse, flowers more covered in foliage.

Rubus largus, spec. nov. Fig. 112.

Robustus, ramosus, eglandulosus, erectus, arcuatus, deinde prostratus, axes petiolique aculeati: folia primocanorum magna, 5-foliolata, glabra supra, subtus molli-pubescentia, margines acute serrato-dentati, armati in costa media subter; foliola elliptico-acuta, interdum latissima in medio vel super medium, 10–14 cm. longa, 6–8 cm. lata: floricani multis lateralibus florentibus; folia 3-foliolata, molli-pubescentia subter; foliola ovata vel oblonga, obtusa vel acuta, 3–6 cm. longa: flores 3 vel 5, singillatim vel ternate in axillis foliorum floralium et leviter ea excedentes, pedicelli plus vel minus aculeati: fructus parvi, pæne globulares, 1 cm. vel plus diam.; calycis lobi divaricati vel reflexi, non elongati, pubescentes.

Robust plant, glandless, with very large leaves soft-pubescent underneath and few flowers on stout axillary pedicels.

Large, the canes 2–3 m. long, at first upright, arching over bushes and becoming prostrate, probably sometimes tip-rooting; axes stout, strongly angled, glabrous unless at tips, branched, bearing few scattered broad-based prickles 4–6 mm. long: primocane leaves large, 5-foliolate, glabrous above, soft-pubescent on lower face, petiole stout and armed; leaflets elliptic-acute with long point, sometimes broadest at or above the middle, 10–14 cm. long, 6–8 cm. broad, aculeate on midrib underneath, margins acutely serrate-dentate: floricanes bearing many flowering laterals, leaves 3-foliolate, soft-pubescent underneath; leaflets ovate to oblong, acute to obtuse, 3–6 cm. long: flowers 3–5, borne singly or trebly in axils of floral leaves and little exceeding the leaves, pedicels more or less aculeate: fruit small, nearly gobular, about 1 cm. or a little more across; calyx-lobes spreading or becoming reflexed, not elongated, pubescent.

Northern Texas: nine miles northwest of Jacksboro, Jack County, in moist shady spots on hillside in oak woods, *Rogers McVaugh 7210.*

I do not know where to place this robustious plant in the Flagellares, if it belongs there, but perhaps it is associable with *R. Lundelliorum* even though the leaflets of that plant are very narrow and the flowers many in broad clusters.

Rubus cordifrons, stat. nov. Fig. 113.

R. prosper var. *cordifrons*, Bailey, Gent. Herb. v, 373, fig. 166c (1943).

Here is a natural separation. When I described *Rubus prosper* in 1943 from collections on Prudence Island, Narragansett Bay, Rhode Island, I wrote in reference to it and var. *cordifrons* from Maryland and Virginia, that "if *Rubus prosper* does not turn up between Rhode Island and Maryland the question may arise whether we are here confronted with two closely related species." It has not turned up. We are confronted with two species.

113. RUBUS CORDIFRONS. Strong trailer with many short clusters about equalling the floral foliage, central primocane leaflet semi-cordate. Maryland, Virginia, West Virginia.

Differences between the two species are, as indicated in my former text, in the cordiform terminal or central leaflet of the primocane leaf of *R. cordifrons*, margins of leaves more coarsely serrate, leaflets on flowering parts longer and mostly narrower, pedicels and rachis of floral shoots little if at all aculeate, to which may be added less prickly canes and apparently less branching habit of growth. *R. cordifrons* is readily confused with other species with which it has no immediate relationship. I now have the species from Preston, Randolph and Webster counties in West Virginia. I have not had *R. prosper* from otherwheres than Prudence Island in Narragansett Bay unless doubtfully in an unsatisfactory collection from Nantucket.

Rubus pityophilus, S. J. Smith, spec. nov. Fig. 114.

Arcuatus procumbensque, radicans, eglandulosus nisi in pedicellis, oriens ad 5 dm. vel plus, armatus remotis, rectis vel curvis aculis: folia primocanorum 5-foliolata, tenuia, pæne glabra supra, subtus molli-pubescentia; foliola ovato-acuta vel lanceolato-ovata vel lanceolata, 9–11 cm. longa, 5–7 cm. lata, margines acute serrato-dentati, foliolum terminale latum vel subtruncatum basi: folia floricanorum 3-foliolata vel simplicia, foliola 3–6 cm. longa, ovata vel elliptica: flores 5–8 vel pauciores, magni, 3 cm. diam., petala lata et obtusa; calycis lobi reflexi, breviter acuti; inflorescentia racemiformis, foliosa, in ramulis brevibus.

Vigorous ascending and trailing tip-rooting large species with leaves soft-pubescent underneath, few small glandiferous hairs borne on some of the pedicels, clusters broad and leafy.

Arch-ascending to 5 dm. or more high, canes reaching ground and taking root at tip, main axes 5–10 mm. thick; primocanes terete, glabrous, with scattered straight or straightish slender prickles 2–5 mm. long: leaves 5-foliolate, thin, nearly glabrous on upper face and soft-pubescent on lower face; leaflets ovate-pointed or the laterals narrow-ovate to almost lanceolate, 9–11 cm. long, 5–7 cm. broad, margins irregularly serrate-dentate, terminal leaflet broad or subtruncate at base, petiole bearing small curved or straight prickles: floricane leaves 3-foliolate or simple, soft-pubescent underneath, sharply serrate-dentate, leaflets ovate to elliptic, 3–6 cm. long, acute: flowers 5–8, sometimes fewer, in racemiform open leafy clusters, the spreading pilose pedicels in some specimens bearing a few small glanded hairs; corolla large, 3 cm. across, petals broad and rounded; calyx-lobes soon reflexed, soft-pubescent, with narrow but not elongate point.

Central-southern New York: in Enfield State Park, Tompkins County, *S. J. Smith 3000*, near the pavillion in pine woods (*pityophilus*, Greek, pine-loving).

Suggests *R. prosper*, if one disregards the few weak glands on some of the pedicels, but less armed, leaflets longer in proportion to width, more attenuate to apex, much more coarsely serrate-dentate, flower-clusters more elongate and leafy, petals much broader.

114. RUBUS PITYOPHILUS. Arching but trailing tip-rooter, well armed, leaves soft-pubescent underneath, leaflets deeply acutely serrate to dentate, flowers more or less overtopping leaves. New York.

Rubus densipubens, spec. nov. Fig. 115.

Validus, eglandulosus, foliaceus et floriferus; primocani primum erecti mox recurvi repentesque, ut videtur radicantes, 2 m. vel plus longi, axis angulatus et aculeis armatus 3–4 mm. longis: folia vulgo 5-foliolata, glabra supra, subter molli-pubescentia; foliola ovata et elliptica, 7–10 cm. longa, 5–7 cm. lata, abrupte acuta, sæpe subcordata basi, acute serrata: floricani valde armati; folia 3-foliolata, interdum simplicia, molli-pubescentia subter; foliola ovata, elliptica vel obovata, acuta vel obtusa, 3–6 cm. longa, 2–4 cm. lata, grosse serrata vel dentata: flores 4–12 in latis cymiformibusque inflorescentiis, superantibus folia; corolla 2 cm. vel minus diam., petala valde angusta et separata.

Softly or densely pubescent on leaves underneath, canes ascending then recurving and trailing, presumably tip-rooting, armed, flowers many in cymiform clusters, plant glandless.

Strong bramble, branched, abundantly foliaceous and floriferous; primocanes angled, 2 m. and more long, at first erect, then overarching and trailing, armed with prickles 3–4 mm. long: leaves large, thin except for pubescence, mostly 5-foliolate, glabrous on upper face, soft-pubescent on lower face, petiole armed, stipules narrow and not prominent; leaflets ovate and elliptic, abruptly short-pointed, central one more or less cordate, 7–10 cm. long, 5–7 cm. broad, margins very acutely serrate: floricanes woody, trailing, stoutly armed; leaves 3-foliolate or sometimes simple, soft-pubescent underneath; leaflets various, ovate, elliptic to obovate, acute or obtuse, 3–6 cm. long, 2–4 cm. broad, mostly coarsely serrate to dentate: flowers 4–12, in more or less corymbiform clusters because of the ascending long lower pedicels, mostly somewhat overtopping the foliage; corolla 2 cm. or less across, petals separate and very narrow; calyx-lobes soon reflexed, acuminate but points not elongated.

Southeastern Wisconsin: New Berlin, Waukesha County, *A. M. Fuller F-44-14*, one mile west of Greenfield Park along right-of-way.

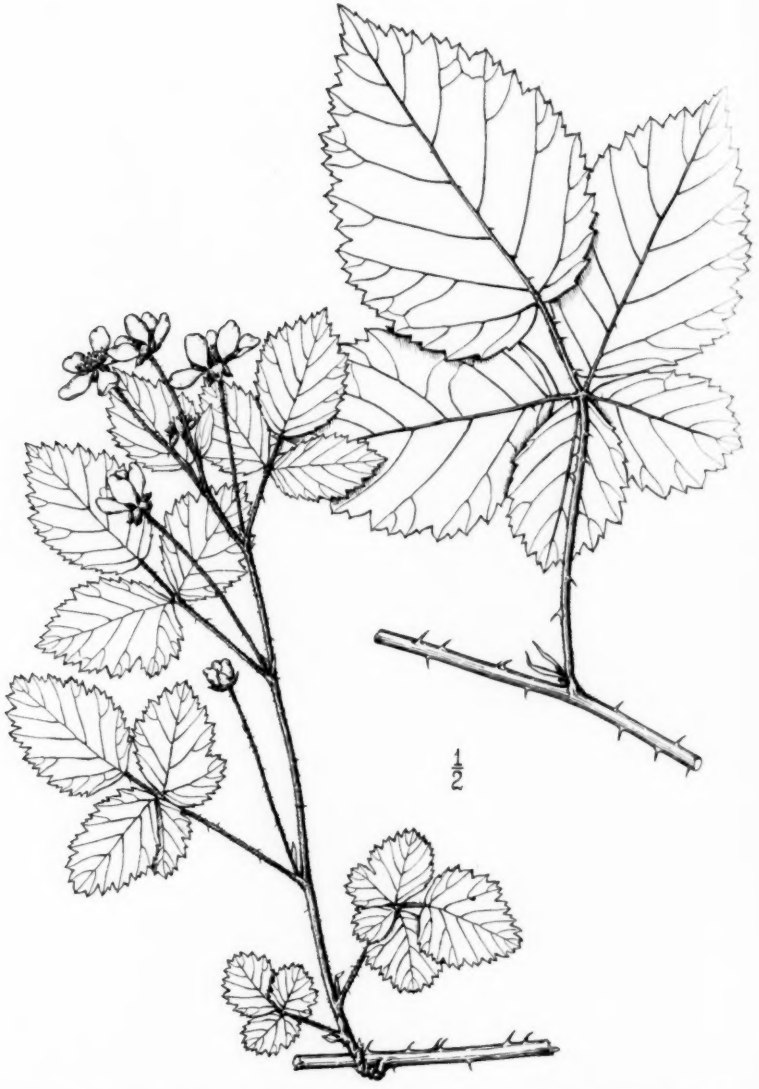
Akin to *R. folioflorus* but a much stouter and more prickly plant, leaves larger and proportionately larger and more regularly acutely serrate, flowers numerous in definite clusters topping the foliage and not buried in it.

Rubus redundans, spec. nov. Fig. 116.

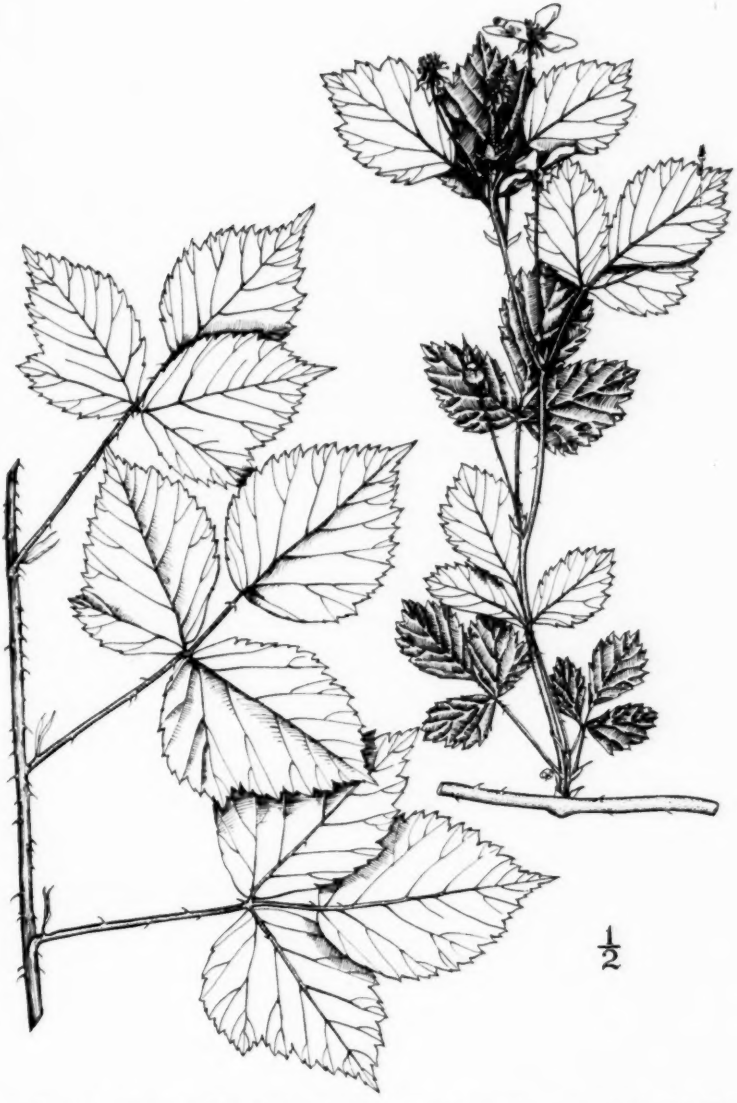
Validus, foliosus, prostratus vel repens; primocani teretes, glabri præter ad apicem, aculei 3–4 mm. longi et pæne recti: folia magna, 5-foliolata, pæne glabra supra, molli-pubescentia subter; foliola ovato-acuta, excedentia, 10–12 cm. longa, 7–9 cm. lata, margines late dentati, foliolum terminale cordatum, petiolus hirsutus aculeatusque; folia floricanorum 3-foliolata vel simplicia, foliola ovalia, elliptica vel oblonga, latissima in medio, brevi-acuta, 4–6 cm. longa: flores 3–5, in plus vel minus glandulosis pedicellis axillaribus excedentibus folia; corolla 2–3 cm. diam., petala lata et obtusa; calyx reflexus, griseo-pubescens, non elongatus, sæpe glandiferus.

Low-ascending, later trailing, probably tip-rooting, more or less glandular on upper parts, leaves soft-pubescent underneath, flowers single in upper axils.

115. RUBUS DENSIPUBENS. Foliaceous and floriferous glandless trailer, foliage soft-pubescent; primocane leaflets acuminate; flower-clusters commonly exceeding the foliage. Southwestern Wisconsin.



116; RUBUS REDUNDANS. Upright at first, becoming prostrate and trailing; leaflets large, soft-pubescent underneath; flowers axillary on leafy shoots. Maryland.



117. RUBUS DEPAVITUS. Maryland. New picture of the species, to contrast with Fig. 116 which is segregated as *R. redundans*. Note discussion on page 304.

Stout leafy plant; primocanes terete, glabrous unless at growing tip, prickles 3–4 mm. long and straight or slightly deflexed: leaves large, 5-foliolate, parts overlapping, nearly glabrous above, soft-pubescent underneath; leaflets ovate-acute, 10–12 cm. long, 7–9 cm. broad, terminal one cordate, margins broadly dentate, petiole hirsute and prickly, stipules on petiole very narrow and conspicuous: floricane leaves 3-foliolate or uppermost simple; leaflets oval, elliptic to oblong, broadest at about the middle, 4–6 cm. long, short-pointed, serrate-dentate: flowers 3–5 on long more or less glandular axillary pedicels of lateral shoots and little if at all exceeding the foliage; corolla large, 2–3 cm. across, the petals broad and obtuse; calyx soon reflexed, gray-pubescent, not elongated, sometimes glandiferous.

Northern Maryland: near Camp Rodman, Aberdeen, Harford County, *S. J. Smith 10,007, 10,013*, both collections from same colony in a filled-in swamp.

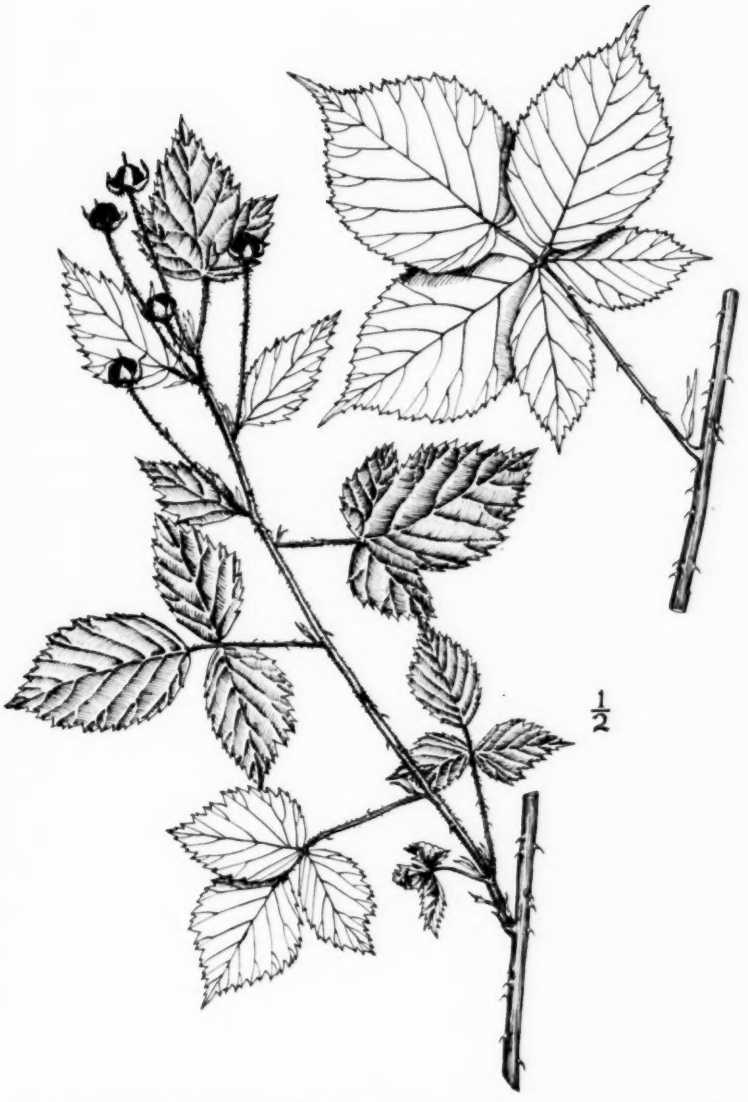
There has been confusion between this plant and *R. deparitus*, both native in Maryland; they are now contrasted, and a new picture (Fig. 117) is inserted of that species. From the plant intended as *R. deparitus* the present species, *R. redundans*, is distinguished as apparently a stronger grower, with densely villous rather than sparsely hairy primocane tips, much larger and overlapping primocane leaflets that are mostly soft-pubescent underneath, more coarsely dentate terminal or central leaflet cordate, flowers several and axillary on leafy shoots rather than few on separate ascending pedicels, floral leaflets much broader. In this *deparitus* group there is much systematic work awaiting, as new collections accumulate.

Rubus Macdanielsii, spec. nov. Fig. 118.

Magnus, prostratus, valde ramosus, radicans, axis glaber et sparse armatus aculeis 2–3 mm. longis: folia primocanorum 5-foliolata, glabra supra, varie pubescentia subtus, petiolus glaber parvis spinis uncatis; foliola ovata vel lato-ovata, foliolum terminale aut centrale 7–9 cm. longum, 6 cm. latum, cordatum basi, alia foliola angusta basi, omnia foliola longo apice, margines irregulariter acute serrata; folia floricanorum 3-foliolata vel simplicia, acute serrato-dentata, ovato-acuta vel elliptico-acuta, 4–6 cm. longa: flores pauci, ascendentes in axillis superioribus, non folia excedentes, pedicelli æque ut axes florales glandiferi: fructus parvi, drupeolæ paucæ; calycis lobi divaricati vel erecti, glandiferi.

Large species, glandular on floral axes and pedicels, tip-rooting, leaves pubescent underneath, flowers single from axils of flowering branches.

Primocanes long, prostrate, radicant, axis glabrous and sparsely armed with slightly curved prickles 2–3 mm. long: leaves 5-foliolate, abundant, glabrous on upper face, variously pubescent on lower face, petiole glabrous and bearing small hooked prickles; leaflets ovate to broad-ovate, terminal one 7–9 cm. long and 6 cm. broad and cordate at base, others narrowed to base and not as broad, all of them with tapered points, margins irregularly acute-serrate: floricanes branched, the main axis glandless and aculeate;



118. RUBUS MACDANIELSII. Large plant in Maryland, glandiferous on top parts, primocane leaflets abruptly acuminate, flowers ascending from upper axils.

leaves 3-foliolate or simple, sharply serrate-dentate, more or less pubescent underneath, blades ovate-pointed to elliptic-pointed, 4–6 cm. long: flowers few in upper axils of somewhat glandiferous floral shoots, on slender sparsely gland-bearing pedicels and not overtopping the foliage: fruit small, of few drupelets; calyx-lobes upright to spreading, ribbed, pilose and gland-bearing, tips sometimes produced.

Northwestern Maryland: one mile north of Sabillasville, Frederick County, in thicket along Prior road, altitude about 2,500 feet, *L. H. MacDaniels & G. H. M. Lawrence 1204*.

This species suggests *R. exsularis* but it is a much less rampant grower, less armed, leaves less soft-pubescent and more sharply serrate-dentate, pedicels less glandiferous, more separate and elongated.

Rubus jactus, spec. nov. Fig. 119.

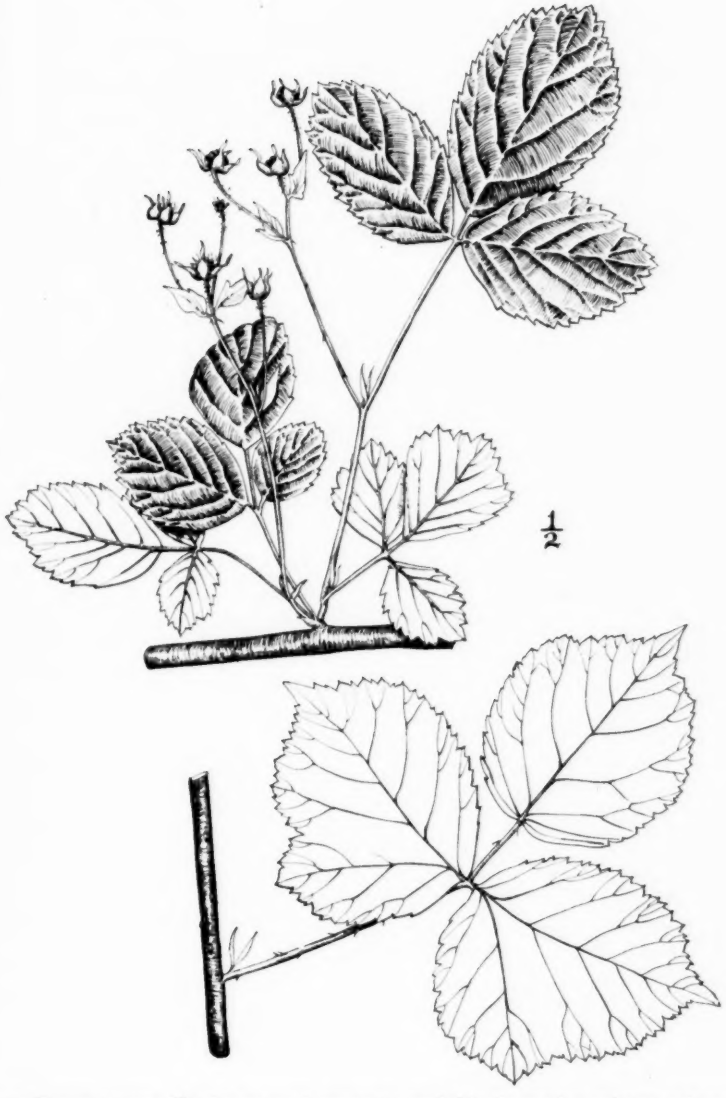
Validus, prostratus, pæne vel admodum glaber, interdum glandiferus in axibus floralibus, pedicellis et calyce; primocani teretes, sparse aculeati, plus vel minus caducis aculeis 1–2 mm. longis: folia 3-foliolata, foliola lato-ovata, rotundata vel tenuiter subcordata basi, 6–8 cm. longa, 5–6 cm. lata, abrupte acuta, margines serrati vel dentati, stipulæ magnæ; folia floricanorum 3-foliolata vel simplicia, foliola ovalia vel elliptica, interdum cuneato-obtusa: flores 3 vel 5, quisque in erecto brevique pedicello axillari bracteis latis subtento; calycis lobi lati, ascendentes, pubescentes, non valde extenti.

Rank grower, prostrate, glandiferous on pedicels and floral axes, flowers 3–4 or 5 on short ascendate pedicels that about equal the leaves.

Primocanes terete, glabrous or essentially so, nearly nude but bearing a very few minute prickles 1–2 mm. long that readily rub off, probably rooting at tip: leaves large, glabrous above, trace of pubescence on under face, 3-foliolate; leaflets broadly ovate with rounded or slightly subcordate base, 6–8 cm. long, 5–6 cm. broad, abruptly pointed, coarsely broadly serrate to dentate, petiole sparsely aciculate, stipules large and prominent: floricane leaves 3-foliolate to simple; leaflets oval to elliptic or some of them obtuse with cuneate base, somewhat pubescent underneath: flowers 3–5 on erect glandiferous axillary pedicels each one of which is subtended by a conspicuous broad bract, nearly or quite equalling the foliage, axis of floral shoots gland-bearing; calyx-lobes broad, ascending, pubescent and more or less glandular.

Northwestern Vermont: near Burlington, Chittenden County, field south of road to Appleton Point and east of railroad, *Ezra Brainerd*, August 14, 1914 (type), and field east of railroad and north of Steinberg barn, *Brainerd*, June 29, 1914. This plant is figured by Brainerd and Peitersen in Bulletin 217, Vermont Experiment Station, 1920, in Plate xxxvi, as *R. Baileyanus* × *flagellaris*, syn. *R. invisus*.

Perhaps to be associated in comparison with *R. exsularis* and *R. Macdanielsii*; from the latter it is known by its larger and much broader primocane leaflets that are not narrowly acutely toothed or serrate as well as



119. RUBUS JACTUS. Nearly unarmed, prostrate, probably tip-rooting, primocane leaves abruptly pointed, flowers few on erect gland-bearing pedicels. Northwestern Vermont.

the pointless or even obtuse floricane leaflets and less long-pedicelled flowers, primocanes much less armed.

Rubus Sanfordii, spec. nov. Fig. 120.

Prostratus et radicans ramis ascendentibus, aciculæ paucæ vel nullæ, folia pæne vel admodum glabra, eglandulosa præter in pedicellis: folia primocanorum 3–5-foliolata, foliolum terminale lato-ovatum et grosse dentatum, 7–8 cm. longum, 5–6 cm. latum, foliola lateralia fere angusto-oblonga et sæpe obtusa: pedicelli 1–4 ad nodum, deinde 3–5 cm. longi, pæne vel admodum inermes: fructus globulares vel brevi-conici, circa 1 cm. longi, drupeolæ magnæ; calyces lati, erecti, leviter pubescentes.

Trailer or mounder, tip-rooter, with narrow-oblong floricane leaflets and elongated sparsely glandiferous pedicels.

Strong plant, much-branched, nearly or quite glabrous unless on pedicels, bearing long prostrate rooting canes and conspicuous upright branchlets, primocanes terete and sparsely or remotely prickly or even nude: leaves 3–5-foliolate, light green in color, lateral leaflets often noticeably smaller than the terminal one, the latter broad-ovate and pointed and coarsely toothed, 7–8 cm. long and 5–6 cm. broad, laterals narrow-ovate, petiole usually nude: floricane leaves distinctly different from those on the primocanes, the leaflets mostly narrow-oblong and often nearly or quite obtuse, 5–7 cm. long and 3–4 cm. broad, coarsely toothed or even notched: pedicels 1–4 from a node, remotely prickly and usually bearing a few glandiferous hairs, becoming 3–5 cm. long and the main or central one often forked and bearing a leafy bract: fruit globular to short-conic, 1 cm. or more long, drupelets large; calyces broad and erect, thinly pubescent.

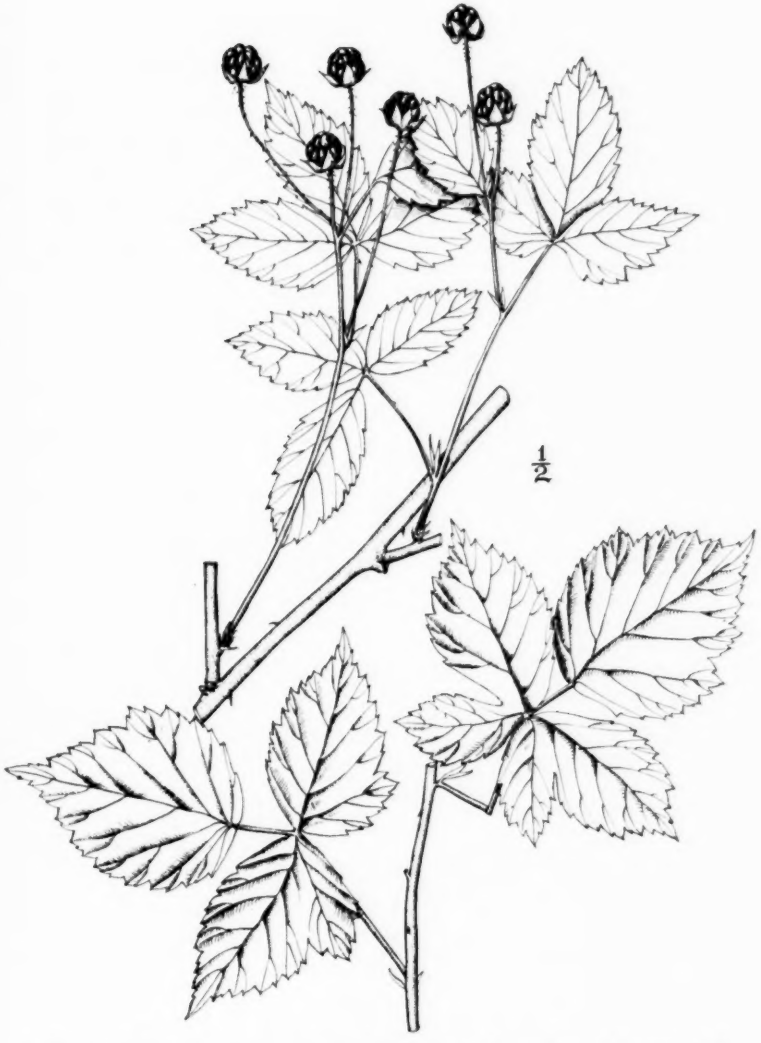
Massachusetts: Fort Phoenix region at Fairhaven, Bristol County, in thickets, *S. N. F. Sanford.*

Perhaps to be associated with *R. invisus*, but foliage more glabrous and dentation much coarser, floricane leaflets narrower and relatively longer and more coarsely dentate, pedicels stiffer and more devoid of armature; plant apparently more upright or ascending.

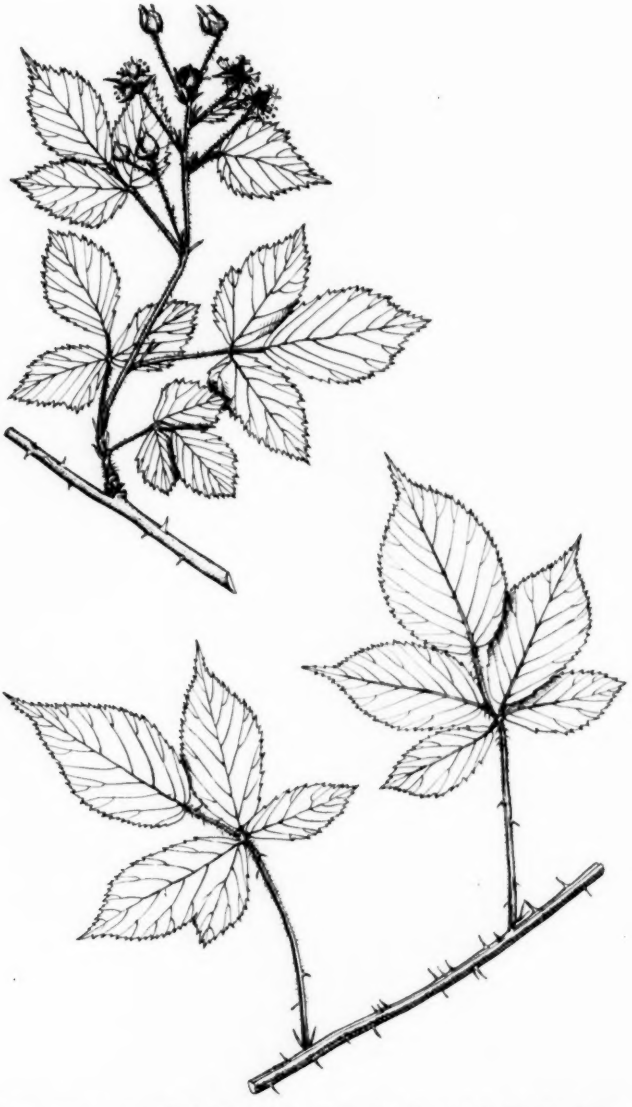
Before leaving the Flagellares I present a picture of *R. alius*, Fig. 121, because it was not illustrated when published in Gentes Herbarum v, page 400, 1943. It is a clear-cut species of Connecticut and Rhode Island. It is a slender thin-leaved trailer with pedicels and calyces mostly more or less glandular, contrasted with *R. particeps* of Nova Scotia because terminal or central leaflet of primocane leaf is elliptic and long-pointed rather than ovate and briefly pointed, leaflets sometimes 5 rather than 3, floricane leaflets differing in same particulars, flower-clusters narrower and usually more open, pedicels more conspicuously glandiferous. It belongs in the *R. fraternalis* relationship.

Cuneifolii

None of the species described in this Fascicle falls within the dry-land



120. RUBUS SANFORDII. Stout and much-branched, tip-rooting; primocane leaflets short-pointed, dentate; pedicels usually exceeding floral foliage and often gland-bearing. Eastern Massachusetts.



121. RUBUS ALIUS, now first illustrated. Weak thin-leaved trailer in Nova Scotia, gland-bearing on short diverging pedicels, primocane leaflets acuminate and rather narrow. See page 308.

Section Cuneifolii, but *R. texanus* has strong resemblance to species of that association; and I have imperfect material from areas far removed from the eastern coastal plain that suggest the Section; I await further collections with anticipation. A new species of the Cuneifolii, *R. uliginosus*, is founded by Fernald in Rhodora for June, 1947, growing in Great Dismal Swamp of Virginia, being, with *R. Humei*, the second paludose member of the Section yet described.

Canadenses

Section Canadenses was proposed by Bailey twenty-four years ago, on an earlier page of Gentes Herbarum from one on which Allegheniense was established. The two sections are indeed similar but lack of glandulosity and mostly also of prickles in the Canadenses visually distinguish it. The smooth unarmed primocanes and characteristic brown color of the mature bark indicate the section even though complete specimens are lacking or one may have parts of a species that is more or less prickly (as in Fig. 122). The thin glabrous leaves are also good marks. A few Canadenses-like species, as *R. separ* and *R. uber*, are glandiferous and I place them in the Allegheniense; yet after long years of experience I find the two sections to be useful in taxonomic and descriptive work and I still retain them.

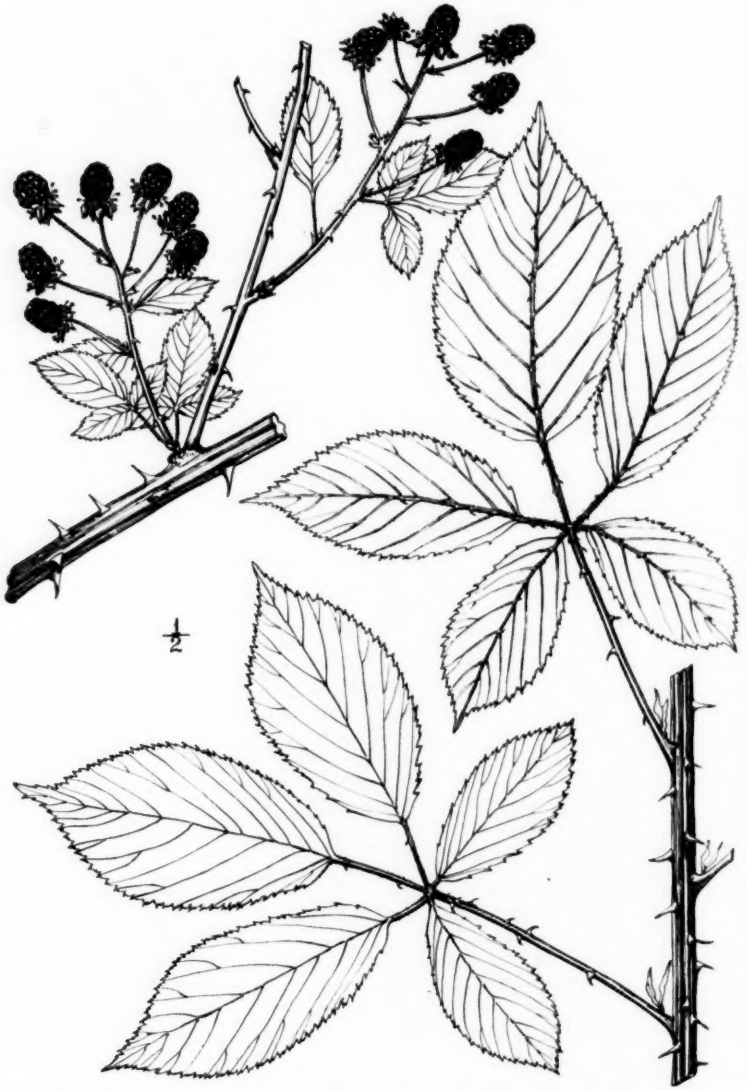
One species was added by Bailey, *R. lætabilis*, in Hanes, Flora of Kalamazoo County, Michigan, 1947.

Rubus monongaliensis, spec. nov. Fig. 122.

Erectus, validus ad circa 2 m. altus sed superarcuatus in dumis et ripis, eglandulosus; primocani angulati, nonnullæ partes nudæ, aliæ aculeatæ: folia magna et multa, 5-foliolata, petioluli longi, petiolus vulgo aculeatus; foliola elliptica vel oblonga, acuta sed non longo-acuminata, 9–12 cm. longa, 5–6 cm. lata, interdum subcordata, sæpe latissima super medium, glabra supra, sparse pubescentia subter, margines minute serrati: folia floricanorum 3-foliolata vel simplicia, vulgo parva, minute serrata: flores circa 1.5–2 cm. diam., 4–7 in lata expansa inflorescentia foliosa basi, pedicelli elongati: fructus oblongi, circa 15 mm. longi cum maturi, drupeolæ multæ; lobi calycis reflexi, pubescentes, acuti, non elongati.

Upright and arching big bramble with more or less prickly canes, glandless, leaves not slenderly acuminate, flowers in many short open clusters not much if any exceeding the foliage.

Stout very fruitful plant perhaps potentially nearly or quite 2 m. tall but the floricanes overarching on bushes and down banks; primocanes stout, angled, some parts of them wholly nude and other parts bearing flat-based strong prickles 5 mm. long: leaves large, 5-foliolate with long petiolules and the petiole commonly armed; leaflets elliptic to oblong, abruptly to shortly pointed or not long-acuminate, 9–12 cm. long, 5–6 cm. broad and frequently broadest above the middle, glabrous on upper face, thinly pubescent on lower face, central leaflet often somewhat subcordate, margins closely finely serrate: floricanes angled and more or less prickly; leaves 3-foliolate



122. RUBUS MONONGALIENSIS. Stout plant to 2 m. tall, frequently with prickles on some of its parts, glandless, with narrow acuminate leaflets, flowers and fruits abundant in short clusters. Northern West Virginia.

or some of them simple, usually somewhat pubescent on under face; leaflets for the most part small and often nearly or quite obtuse, finely serrate: flowers rather small but showy because so numerous, 1.5–2 cm. across, petals obtuse and separate, 4–7 of them in a short cluster racemiform in structure (1 flower terminating the straight rachis), but cymiform in appearance because of the elongated pedicels, leafy at base, bracts not conspicuous: fruit oblong, compact, of many drupelets, about 15 mm. long at maturity; calyx-lobes soon reflexed, pubescent, acute but not elongated.

Northern West Virginia: Monongalia County, Willowdale Road, *Mr. & Mrs. H. A. Davis 7392* (type); Collins Ferry Road, *Davis 7343*, "not in the mountains, an unlikely place for *R. canadensis*"; *7394*.

More aculeate plant than *R. canadensis*, leaflets not long-acuminate nor all of them more or less subcordate, flower-clusters shorter, broader and less racemiform, bracts in inflorescence less prominent.

Rubus illustris, spec. nov. Fig. 123.

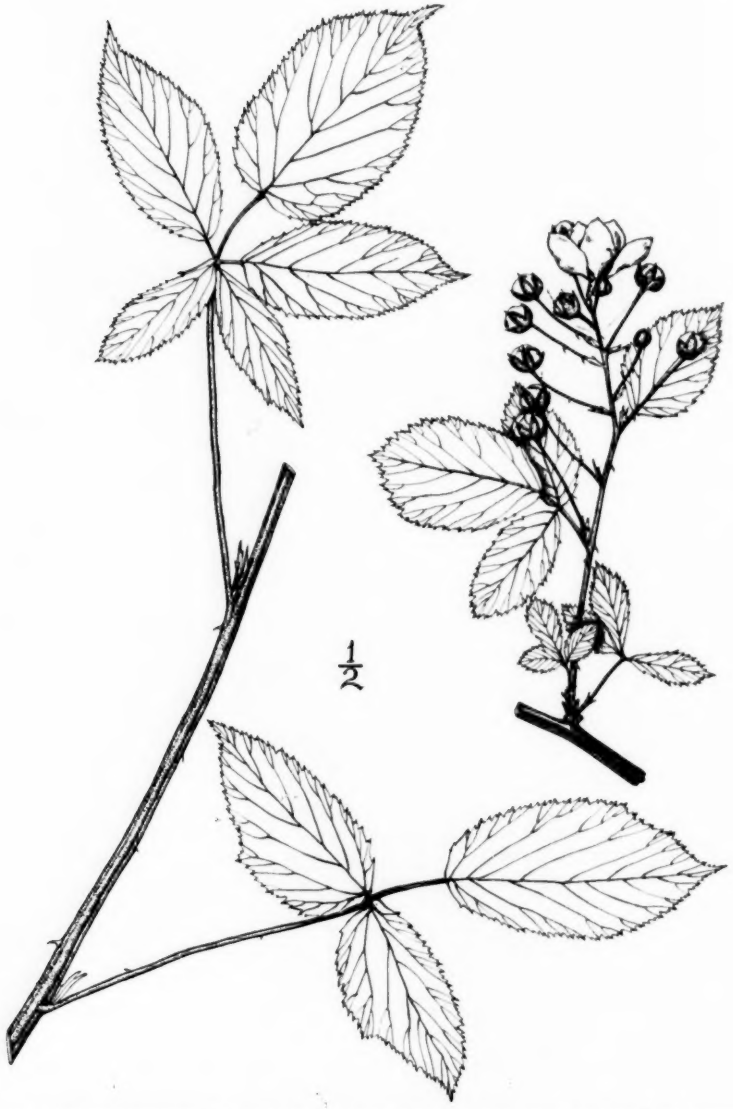
Validus, erectus, 2 m. altus, pæne vel admodum inermis; primocani angulati, glabri: folia 3–5-foliolata, glabra supra, molli-pubescentia subter; foliola elliptico-ovata, interdum latiora vel angustiora, 7–9 cm. longa, 3–5 cm. lata, non cordata, apex acutus sed non attenuatus, margines stricte acute serrati: folia floricanorum vulgo 3-foliolata; foliola late elliptico-ovata vel ovata, 8–9 cm. longa, 4–6 cm. lata, grosse serrata: flores 8–12 in divaricatis racemosis inflorescentiis foliosis basi; pedicelli graciles, 2–3 cm. longi; corolla 2–3 cm. diam., petala lata obtusaque; lobi calycis lati, breviter acuti, minute pubescentes.

Head high, nearly devoid of prickles, glandless, leaves pubescent underneath, flowers in racemes about equalling the leaves, pedicels slender.

Bright showy distinct (whence *illustris*) erect species, 2 m. tall; primocanes angled, glabrous, unarmed or with now and then a short weak prickle: leaves 3–5-foliolate, glabrous or with few unnoticeable short hairs above, pubescent or soft-pubescent underneath, petiole long, nude or with a few small hooks; leaflets elliptic-ovate or narrower, mostly regular in shape at maturity, not cordate, apex acute but hardly attenuate, 7–9 cm. long, 3–5 cm. broad, margins closely and acutely serrate: floricane leaves mostly 3-foliolate; leaflets broader and briefly acute, 8–9 cm. long and about one-half or more as broad, rather coarsely acutely serrate: flowers 8–12 in lateral racemes leafy at base and equalling or somewhat exceeding the leafage; pedicels slender, 2–3 cm. long, divaricate or nearly so, the lowest one in a remote axil; corolla 2 cm. and more across, petals broad, obtuse and close together; calyx-lobes broad, minutely pubescent, pointed and not nearly equalling the petals.

Western North Carolina: on bank near Swiss, Yancey County, *Bailey 434*, altitude 2,600 feet.

A novel element in the erect strong Canadenses, lacking the long-attenuate leaflet tips and bearing relatively short but distinctly racemose very open flower-clusters with continuing rachis, and large flowers with broad petals.



123. RUBUS ILLUSTRIS. Tall but slender plant, glandless and nearly unarmed, primocane leaflets narrow short-pointed, flowers in raceme-like clusters. Western North Carolina.

124. RUBUS FORESTALIS. Thin slender practically unarmed bramble in mountains of western North Carolina, with very narrow long taper-pointed leaves and racemiform clusters standing above the floral foliage.

Rubus forestalis, spec. nov. Fig. 124.

Gracilis, erectus, fortasse 1 m. altus, inermis vel interdum paucis aculeis sparsis 1–2 mm. longis, glandiferus in axe florali, in pedicellis et interdum in calyce: folia primocanorum conspicue 5-foliolata, petiolus et petioluli longi tenuesque; foliola nitida, elliptico-lanceolata vel lanceolato-oblonga, longo-acuminata, 10–12 cm. longa, 3–4 cm. lata, margines stricte acute serrati, glabri supra, subter minute hirsuti: folia floricanorum 3-foliolata; foliola pæne lanceolata vel lanceolato-obovata, 4–6 cm. longa: flores 7–15 in angustis racemiformibus inflorescentiis superantibus folia: fructus globulari-oblongi, circa 1 cm. diam., drupeolæ succosæ; lobi calycis reflexi, pubescentes, acuti sed non elongati.

Very slender practically unarmed thin-leaved narrow-leafleted bramble with flowers and fruits in nearly naked more or less gland-bearing racemiform clusters, pedicels mostly glandular.

Diffuse-upright, probably not standing erect by its own strength, perhaps 1 m. or less tall; primocanes slender, glabrous, either completely nude or carrying a few remote declined very small spines 1–2 mm. long: leaves conspicuously 5-foliolate, glabrous on upper face, minutely hairy on lower face, surfaces more or less shiny, petiole and petiolules very slender and sometimes aculeate, stipules inconspicuous and very thin; leaflets elliptic-lanceolate or lance-oblong, slenderly long-acuminate, 10–12 cm. long, 3–4 cm. broad, margins very closely and finely acutely serrate: floricanes slender, unarmed or bearing only very few small scattered prickles; leaflets 3, nearly lanceolate and pointed to long lance-obovate and nearly obtuse, 4–6 cm. long, finely to almost coarsely serrate: flowers 7–15 in racemiform narrow clusters leaf-bearing at base and standing above the foliage, axis and pedicels variously glandular-hairy: fruit globular-oblong, about 1 cm. plus long, of loosely adherent succulent drupelets; calyx-lobes reflexed, acute but not elongated, pubescent, sometimes glandiferous.

Western North Carolina: Highlands, Macon County, *M. A. Rice 555* (type), in primeval forest; side of Mt. Satula, Highlands, *W. C. Coker.*

This odd lanky bramble looks like *R. canadensis* except for its very narrow acuminate leaflets with parallel sides, and I associate it with the Canadenses rather than with the Alleghenienses in spite of few glands in the inflorescence. This species appears to bear no immediate relation to the southern montane *R. uber,* Fig. 125, which is a much stronger and heavily armed very glandular bramble, with broader leaflets soft-pubescent underneath; but both *R. forestalis* and *R. uber* raise questions of classification as between the Canadenses and Alleghenienses.

Rubus perdebilis, spec. nov. Fig. 126.

Valde debilis, diffusus, fortasse radicans, sed erectus vel ascendens, eglandulosus; axes graciles, teretes, sparsis aculeis 1–3 mm. longis: folia 3–5-foliolata, tenuia, glabra supra et subter nisi interdum parce pilosa subter; foliola ovato-acuminata vel elliptico-acuminata, 9–10 cm. longa, 4–5 cm. lata, acute serrata, petiolus minute armatus: folia floricanorum varia, 3–5-foliolata; foliola oblongo-ovata vel elliptico-acuminata, 8–9 cm.

125. RUBUS UBER now again illustrated (see Fig. 242, Gent. Herb. v) to contrast it with *R. forestalis* and associates, which is heavily glandular and is accounted one of the Alleghenienses. See page 316.

126. RUBUS PERDEBILIS. Diffuse, very slender and branches often trailer-like, clusters small and broad mostly surpassed by the leaves. Upper Michigan.

longa sed in partibus floralibus multo minora et angustiora, serrata vel laciniata: flores 5–8 in gracilibus pedicellis nudis 2–3 cm. longis in valde lata inflorescentia non folia excedente; lobi calycis divaricati vel reflexi, non elongati.

Upright plant but leaning and becoming entangled, mildly prickly, glandless, flowers on very slender naked spreading pedicels.

Very diffuse, branching, some of the parts ending in long leafless ends as if to tip-root, ascending in habit but arching over; axes slender, terete, with few scattered prickles 1–3 mm. long, glabrous: leaves 3–5-foliolate, thin, glabrous on upper face, glabrous or only minutely pilose on veins underneath; leaflets ovate-acuminate to elliptic-acuminate, sometimes subcordate at base, 9–10 cm. long, 4–5 cm. broad, margins acutely unequally serrate, petiole and petiolules minutely armed; floricanes terete and with scattered armature; leaves 3–5-foliolate; leaflets oblong-ovate to elliptic-acuminate and 8–9 cm. long in the larger examples, much smaller and lanceolate to somewhat oblanceolate on floral parts, coarsely serrate and sometimes jagged: flowers 5–8 in a very broad open cluster among or below the leaves, the thread-like pedicels 2–3 cm. long; calyx-lobes soon spreading, not elongated.

Upper Michigan: Porcupine Mountains, Ontonagon County, *H. T. Darlington 1227*.

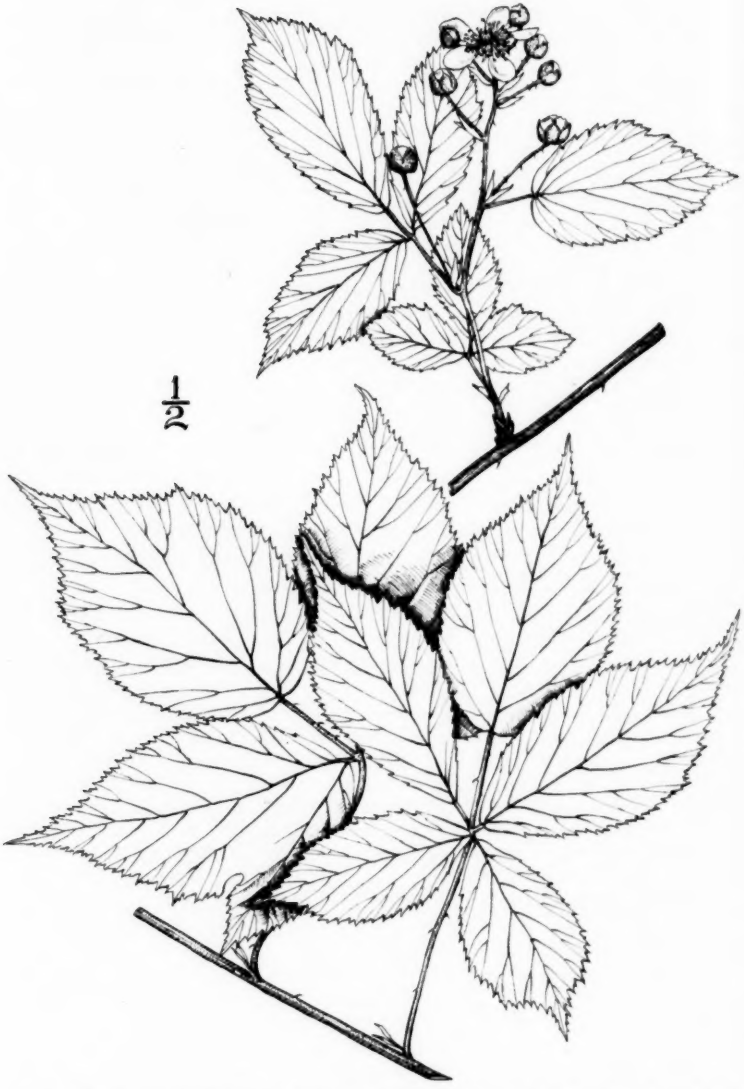
Perhaps to be associated with *R. multilicius*, but that plant is stouter and much more prominently armed with real prickles than *R. perdebilis*, its leaves much more slenderly acuminate, calyx-lobes elongated, pedicels conspicuously bracteate at base and sometimes on its axis.

Rubus irregularis, spec. nov. Fig. 127.

Erectus, diffusus, 1 m. vel plus altus, foliosus, eglandulosus, glaber nisi in pedicellis calyceque; primocani angulati, pæne sine aculeis: folia 3–5-foliolata, petiolus nudus vel acicularis; foliola ovato-acuminata vel angustiora, 9–12 cm. longa, 5–6 cm. lata, foliolum terminale latum et subcordatum basi, margines acute irregulariter serrati: floricani graciles; folia 3-foliolata, sæpe simplicia in inflorescentia; foliola floralia irregularia in forma magnitudineque, oblonga, angusto-elliptica et pæne obovata, 5–8 cm. longa: flores circa 6, subtenti 1–3 in axillis, vulgo foliis superati, bracteæ prominentes; corolla 2 cm. vel plus diam., petala obtusa; lobi calycis puberulenti, lati, brevi-acuti.

Odd member of the *R. canadensis* tribe, of diffuse upright but not direct growth, with irregularly shaped leaflets and flower-clusters, many of the floral leaflets broadest above the middle.

Upright, diffuse and not rigid, 1 m. or more, leafy, glandless, glabrous unless on pedicels and calyx, bearing very few scattered weak pricklets; primocanes angled, smooth: leaves 3–5-foliolate, petiole nude or sparsely weakly aciculate, stipules very small; leaflets ovate-acuminate or the lower pair very narrow and almost broad-lanceolate, 9–12 cm. long, 5–6 cm. broad, terminal or central leaflet broad to subcordate at base and narrowly produced at apex, margins acutely unevenly serrate: floricanes slender, terete; leaves 3-foliolate or simple at base of inflorescence; leaflets elliptic



127. Rubus irregularis. Weak practically unarmed upright glandless bramble in southwestern New York, with irregular somewhat racemiform clusters among the leaves.

and 10–12 cm. long but at the inflorescence irregular in shape, much smaller and oblong, narrow-elliptic to somewhat obovate or cuneately based, 5–8 cm. long, margins deeply and not uniformly serrate: flowers about 6 terminating a short leafy lateral with 1–3 others remote in axils, forming an irregular cluster usually exceeded by the foliage, bracts prominent; corolla 2 cm. or more wide, petals obtuse, separate; calyx-lobes puberulent, broad, short-pointed.

Southwestern New York: near Andover, Allegany County, *Bailey 304*, on dry hill in partial shade, altitude about 2,300 feet. It grew in a great loose tangled colony, apparently progressing in all directions; other colonies in the vicinity.

Probably more or less related to *R. acridens* but lacking the prickles, leaflets narrower and more acuminate and margins much less deeply and acutely serrate, flower-clusters longer and of different form, floral bracts much more prominent. Striking features of *R. irregularis* are the irregular leafage and florescence.

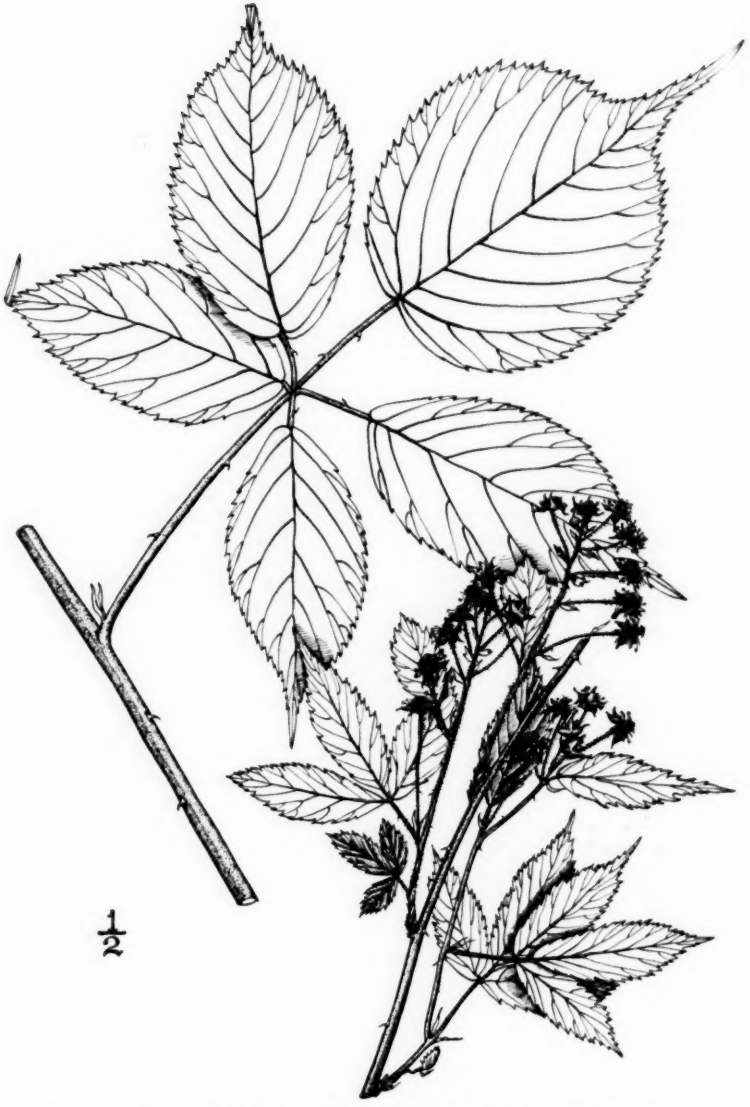
Rubus Besseyi, spec. nov. Fig. 128.

Diffusus, erectus, ramosus, eglandulosus, 1 m. vel minus latus, pæne vel admodum inermis; primocani teretes: folia 5-foliolata, glabra supra, subter pubescentia, petiolus fere nudus; foliola ovata vel lato-ovata, longo-acuta, 10–15 cm. longa, 7–8 cm. lata, foliolum centrale subcordatum, margines grosse serrati vel laciniati, dentati: folia floricanorum 3-foliolata, interdum simplicia, elliptica vel angustiora, 7–8 cm. longa, plus vel minus pubescentia subter, serrata vel dentata: flores parvi, 6–8 in gracilibus erecto-patulis pedicellis, inflorescentia foliosa et folia non excedens: fructus parvi, circa 1 cm. diam., drupeolæ paucæ et carnosæ; calyx divaricatus vel reflexus, lobi angusto-acuti.

Erect low unarmed glandless branchy bush with flowers on ascending lateral leafy shoots and fruits of few drupelets.

Diffuse, erect or strongly upright, 1 m. or less tall, with many leafy floriferous branches; primocanes terete, nude or nearly so: leaves large, mostly 5-foliolate, glabrous on upper face, pubescent to almost soft-pubescent underneath, petiole nude or now and then with a small prickle or two; leaflets ovate to broad-ovate and long-pointed, 10–15 cm. long, 7–8 cm. broad, central one subcordate, margins coarsely serrate to cut-toothed on the downward half: floricanes terete to obscurely angled, usually nude; leaves commonly 3-foliolate, sometimes simple; leaflets elliptic for the most part but at the inflorescence very narrow, 7–8 cm. long, less or more pubescent underneath, margins serrate to cut-toothed: florescence in the form of leafy lateral clusters, usually not exceeding the foliage and often covered within it; flowers small, 6–8 on slender upright-spreading pedicels: fruit small, about 1 cm. across, of few fleshy drupelets; calyx divaricate or reflexed, pubescent, lobes narrow and pointed.

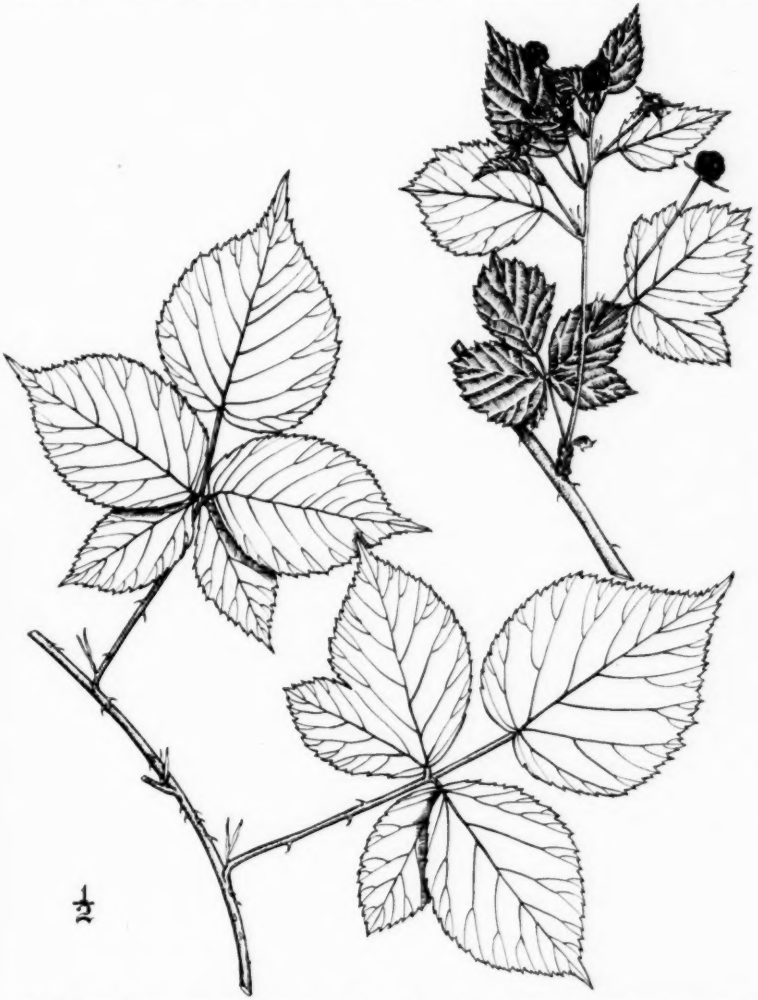
Upper Michigan: Porcupine Mountains, Ontonagon County, *E. A. Bessey 1252* (type), *1200*, on talus slopes along main ridge, collected 1923;



128. RUBUS BESSEYI. Upright to diffuse, much-branched, armature scant or none; leaflets of primocane very broad and abruptly acuminate, of floral parts very narrow; clusters more or less racemiform. Upper Michigan.

J. K. Kroeber 52–39, collected 1934; Delta County, *Kroeber* without number, four miles southwest of Escanaba, collected 1934.

From *R. acridens* this bush differs in its nuder canes, apparently lesser stature, in the long-leafy mode of florescence and the slender separated



129. RUBUS DARLINGTONII. Low, sparingly prickly, diffuse, with flowers few in axils of branchlets; central or terminal leaflet of primocane leaf broad and cordate. Upper Michigan.

pedicels. Specimens have been distributed as *R. amicalis*, but that eastern plant differs in its greater size, more prickles, much narrower and usually not subcordate leaflets, and particularly by the short more compact lateral flower-clusters.

Rubus Darlingtonii, spec. nov. Fig. 129.

Humilis, ascendens, 3–5 dm. altus, glaber, eglandulosus; primocani tenues, teretes, paucis debilibus declinatisque aculeis 2–3 mm. longis: folia 5-foliolata; foliola ovata, prominenter acuta, 6–8 cm. longa, 5–6 cm. lata, foliolum centrale subcordatum, margines stricte acute serrati: folia floricanorum fere 3-foliolata; foliola angustiora: flores 3–6 in gracilibus pedicellis patulis in axillis superioribus non folia superantibus: fructus parvi, pæne globulares, drupeolæ parcæ et carnosæ; lobi calycis breviacuti, tenuiter pubescentes.

Low, glabrous, glandless, somewhat prickly, with central leaflet of primocane leaves cordate or subcordate, flowers few in short leafy clusters.

Diffuse, ascending or more or less erect, 3–5 dm. tall, apparently not tip-rooting, glabrous, glandless; primocanes terete, usually not straight, mostly less than 5 mm. thick, smooth in appearance but bearing a few remote bent very weak declined prickles 2–3 mm. long: primocane leaves mostly 5-foliolate, firm in texture, glabrous both surfaces or perhaps with a few short hairs on veins underneath; leaflets ovate and subcordate or the lateral ones elliptic, prominently and rather abruptly pointed, 6–8 cm. long, 5–6 cm. broad, margins closely and rather sharply serrate: floricanes like the primocanes; leaves mostly 3-foliolate, leaflets much like those of primocanes except narrower: flowers 2 or 3–6, on slender spreading pedicels from upper axils and mostly not surpassing the leaves: fruit small, nearly globular, of few pulpy drupelets; calyx-lobes spreading, short-pointed, thinly pubescent.

Upper Michigan: Porcupine Mountains, Ontonagon County, on dry sterile sunny ridge, *H. T. Darlington 1030, 1031* (type).

Somewhat like *R. montensis* but a smaller less thorny plant lacking long horizontal tip-rooting canes, primocane leaves relatively broader and less narrowly long-pointed, margins more finely serrate, flower-clusters more leafy, flowers and fruits not exceeding the foliage, the pedicels axillary.

Alleghenienses

The Alleghenienses is a dominant Section in North American Rubus, characterized by prickly canes and glandiferous parts. It inhabits wide ranges of territory, mostly on high lands, and it provides pomological varieties of historic importance such as Taylor (*R. allegheniensis*), Agawam, Ancient Briton, Eldorado, Erie, Snyder (*R. Rosa*). The Section yields great crops of wild blackberries in the Appalachian region, garnered for home consumption and for market.

The name *R. allegheniensis* itself cannot be typified; if the name should

130. RUBUS TUMULARIS. Big vigorous bramble to about 2 m. tall, making great mounds, prickles few or none, large fruits in bracted racemiform clusters. New York.

ever be subjugated then *R. nigrobaccus* would be elevated; the merits of this nomenclatorial puzzle are discussed on pages 521 and 522 in Volume v of Gentes Herbarum.

The species *allegheniensis* requires a separate study for closer definition and to determine whether it is really a single species or a congeries that may be named as botanical varieties; such study should be aided by good cytological investigation. If we attempt to divide it into subspecies, varieties, subvarieties, formæ, assumed hybrids, and other personal notions I fear the problem will be beyond definition and solution.

Another species is recently added to the Alleghenienses: *R. Rappii*, Bailey, in Hanes, Flora of Kalamazoo County, Michigan, 1947.

Rubus tumularis, spec. nov. Fig. 130.

Validus, pæne sine spinis, erectus ad pæne vel admodum 2 m. deinde arcuatus repensque non radicans, tumularis, axes sulcati: primocanorum folia valde magna, 5-foliolata, pæne vel admodum glabra et nitida supra, pubescentia subter; foliola ovata vel lateralia elliptica, longo-attenuata, 15–19 cm. longa, 7–12 cm. lata, margines grosse duplo-serrato-dentati: folia floricanorum vulgo 3-foliolata, sæpe simplicia in inflorescentia; foliola ovato-acuta, 9–10 cm. longa, vel angusto-elliptica vel pæne lanceolata, acute serrata vel pæne laciniata: flores 10–15, racemosi, pedicelli divaricati, glandulares: fructus subglobosi, circa 2 cm. longi, dulces; lobi calycis angusti, sæpe prolongati, glandulares.

Big mounder, nearly thornless, with enormous long-pointed leaves, gland-bearing pedicels and upper petioles, edible fruits in racemes.

Very stout singular bramble; primocanes furrowed, 12–14 mm. thick, with now and then a stub of a prickle 2 mm. long but for the most part nude, glabrous, erect to nearly or quite 2 m. tall, finally arching over with long indefinite trailing tips that apparently do not take root: leaves 5-foliolate, very large and with long mostly bare petiole and petiolules giving the frond a sprawly look, upper face shining, glabrous or bearing a few scattered hairs, lower face somewhat pubescent, stipules little evident; leaflets ovate or the lateral ones elliptic, very long-attenuate, 15–19 cm. long, 7–12 cm. broad, margins coarsely doubly serrate-dentate: floricanes much-branched, nearly or quite unarmed; leaves mostly 3-foliolate, frequently simple in the flower-cluster; leaflets from ovate-pointed and 9–10 cm. long to narrow-elliptic or almost lanceolate and long-pointed, margins serrate-dentate to jagged: flowers racemose, the pedicels divaricate, long, glandiferous, terminal flower little overpassed; flowers and fruits 10–15, two or three of them in lower axils, bracts prominent: fruit globular to short-oblong, about 2 cm. long, agreeably sweet; calyx-lobes narrow, often prolonged, gland-bearing.

South-central New York: rich mucky land, edge of Unilar bog, Chemung County, *S. J. Smith 1800*, "an elegant species," "king of the mounders": *tumulus*, a mound.

Nearest ally is *R. separ*, a much less and erect bramble with very different smaller finely serrate leaves, small fruits on shorter pedicels.

Rubus campester, spec. nov. Fig. 131.

Ascendens vel erectus ad 1 m. altus, valde armatus, glandiferus; primocani erecti, aculei recti, sparsi, 4–5 mm. longi: folia 5-foliolata, brevipilosa supra, molli-pubescentia subter, petiolus armatus et sæpe glandiferus; foliola angusto-ovata vel elliptica, vel pæne lanceolata, 9–13 cm. longa, 3–7 cm. lata, acute serrata, longo-acuta: floricanus arcuatus, valde ramosus; folia 3–5-foliolata; foliola in inflorescentia 2–3 cm. vel minus longa, acuta: flores 8–16, racemosi, pedicelli divaricati, glandiferi, bracteæ parvæ sed prominentes, flos centralis lateralibus superatus: fructus parvi, subglobosi, drupeolæ prominentes; lobi calycis reflexi, glandiferi, angusti sed non elongati.

Erect branchy diffuse bramble, gland-bearing, clusters short and leafy on lower part, leaves soft-pubescent underneath.

Strongly ascending to 1 m., stoutly armed; primocanes erect to 1 m., angled; prickles straight, scattered, 4–5 mm. long: leaves 5-foliolate, thinly short-pilose above, soft-pubescent underneath, midrib beneath usually armed; petiole heavily armed, more or less glandiferous; leaflets narrow-ovate to elliptic to nearly lanceolate, 9–13 cm. long, 3–7 cm. broad, very sharply and narrowly unequally serrate, long-pointed, terminal or central one often subcordate: floricanes arching, retaining the armature; leaves 3–5-foliolate unless perhaps in inflorescence, leaflets on flower-shoots often 2–3 cm. or less long and acute: flowers 8–16, racemose, on divaricate glandular pedicels in axils of small but prominent bracts, central flower or fruit about equalled or exceeded by the upper lateral fruits: fruit small, subglobose to short-oblong, seedy; calyx-lobes glandiferous, reflexed, points very narrow but not elongated.

Northeastern Maryland: near Aberdeen, Harford County, *S. J. Smith 3002*, in a thicket-covered depression in sandy woods.

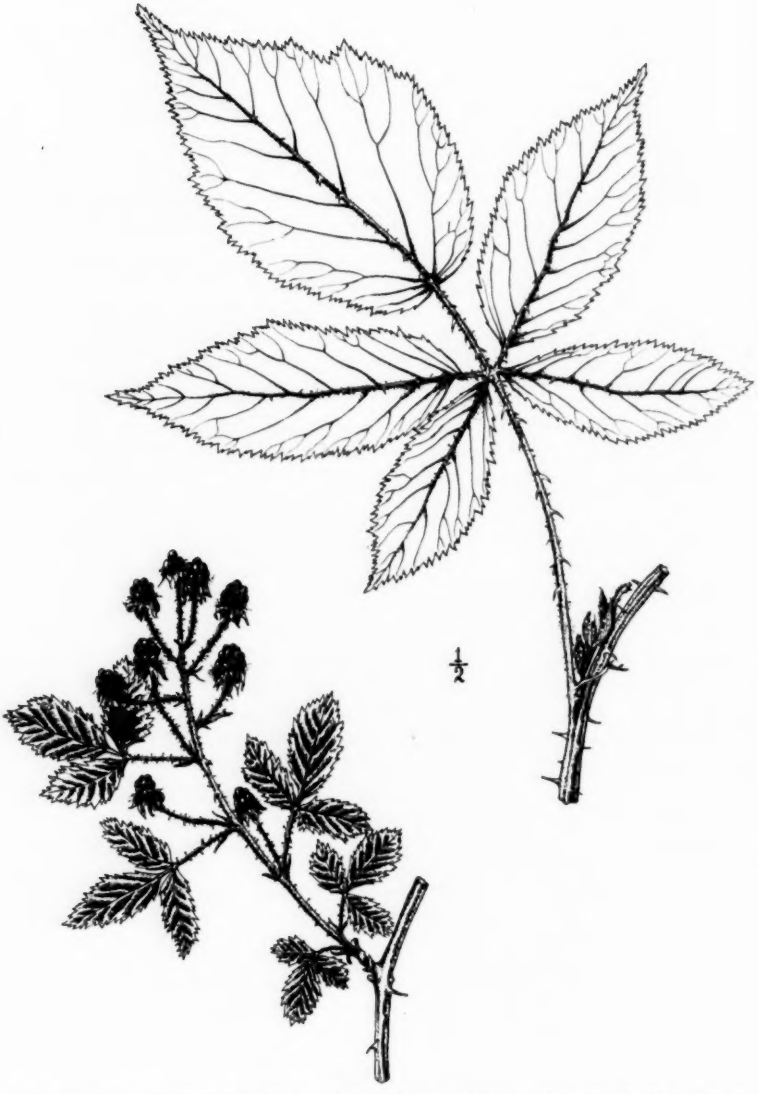
This species may be compared with the large-flowered *R. apianus*, from which it differs otherwise in the racemose rather than cymiform inflorescence, more deeply and sharply serrate leaflets, narrower primocane leaflets, more narrowly pointed calyx-lobes.

Rubus reravus, spec. nov. Fig. 132.

Ascendens, valde ramosus, diffusus, griseus; primocani teretes, 1 cm. diam., aliquid armati gracilibus aculeis 4–5 mm. longis, setis tenuibus et pilis glandiferis, circa 1 m. altus: folia magna, vulgo 5-foliolata, glabra supra, pubescentia subter, petiolus longus et glandiferus, stipulæ longæ et angustissimæ; foliola ovata vel elliptica, 9–12 cm. longa, 5–7 cm. lata, acute serrato-dentata, acuminata; foliola floricanorum similis eis primocani sed minora: flores 8–12 in racemis latis et aliquanto folia superantibus; corolla 2 cm. vel plus diam., petala angusta et obtusa; lobi calycis longo-attenuati; pedicelli divaricati, glandiferi.

Ascending or upright with prickly-hispid glandular canes, flowers and fruits in small clusters topping the leaves.

Upright, some canes erect to 1 m. tall, plant branched and diffuse; primocanes terete, 1 cm. thick, bearing a few stiffish slender prickles 4–5 mm. long not broad-based, many thin setæ nearly or quite as long, inter-



131. RUBUS CAMPESTER. Upright and branching, prickly, primocane leaflets mostly narrow and long-pointed, fruits in racemiform clusters that equal or surpass the foliage. Northern Maryland.

132. RUBUS RERAVUS. Very glandular without strong prickles, primocane leaves taper-pointed, pubescent underneath; flowers many in racemiform clusters, petals very narrow. Western Maryland.

mixed with long glandular hairs: primocane leaves large, mostly 5-foliolate, glabrous above, pubescent underneath, petiole long, prickly and glandiferous, stipules long, very narrow and conspicuous; leaflets ovate to elliptic, sometimes briefly truncate or subcordate at base, 9–12 cm. long, 5–7 cm. broad, margins acutely serrate-dentate: floricanes often with stiffened armature and mostly retaining some or most of the glanded hairs; leaves 3–5-foliolate, much like those of the primocanes but smaller and narrower in the inflorescence and eventually reduced to bracts: flowers 8–12 in racemose formation, prevailingly multiple from a node, but pedicels elongating so that in fruit the cluster may be nearly as broad as long, inflorescence equalling or exceeding the foliage; corolla 2 cm. or more across, petals narrow and obtuse; calyx-lobes glandular, with long very thin spreading points; pedicels setose and glandiferous.

Extreme western Maryland: Mountain Lake Park, Garrett County, *E. S. Steele 53* (type), *130*, *142*, mostly marked Oakland Road, collected 1921.

Much stouter plant than *R. ravus*, with larger heavier foliage, very different armature, larger flowers, leaflets commonly much broader in proportion.

Arguti

A natural Section proposed by Rydberg in 1913. It comprises, with the gland-bearing Alleghenienses, the common highbush field blackberries in many species and numberless phases. The highbush blackberries are still commonly thought of as a single species, or perhaps more truthfully very few persons until recent time have cared enough about them to try to understand them. We now know they are a fascinating lot, and as soon as we forget to think of them as hybrids we shall collect and study them.

Fernald in Rhodora for June, 1947, has added another species, *R. cupressorum*, from swamps in southeastern Virginia; and eight novelties are included herewith. The Section differs from Alleghenienses primarily in the absence of glands.

Rubus associus, Hanes, spec. nov. Fig. 133. By C. R. Hanes, on request.

Erectus ad 2 m. vel plus, arcuatus, eglandulosus, valde floriferus; aculei prominentes in floricanis et primocanis, 3 mm. longi, recti vel aliquid curvi: folia primocanorum 5-foliolata, glabra supra, sparse pubescentia subter, margines minute et compacte serrati; petiolus longus armatusque; foliola ovato-oblonga, 5–7 cm. longa, 3–4 cm. lata, acuminata; folia floricani parva, 2–3 cm. longa, 1 cm. vel plus lata, brevi-acuta vel obtusa: flores circa 10 in multis condensis inflorescentiis et foliaceis, parvi; pedicelli 1–2 cm. longi, pubescentes: fructus brevi-oblongus, 1 cm. longus, edulis.

Erect or arching glandless bramble often 2 m. in length, having prominent straight or somewhat curved prickles about 3 mm. long on both primocane and floricane: primocane leaves usually 5-foliolate, smooth

above and lightly pubescent beneath with margins finely and evenly serrate and with long armed petioles; leaflets ovate-oblong, 5–7 cm. long, 3–4 cm. wide, rather short-acuminate: floricane leaves 3-foliolate or sometimes simple, small, 2–3 cm. long, 1 cm. or more wide, short-acute or ob-

133. RUBUS ASSOCIUS. Large plant, very prickly, primocane leaflets narrow and long-acuminate; flowers in racemiform clusters that overtop the associated leafage. Southwestern Michigan.

tuse: flowers small and about 10 in a cluster, the clusters many and leafy: fruit short-oblong, about 1 cm. long, juicy and pleasant to the taste.

This species, *Rubus associus* (meaning associated with) is so-named because, in the neighborhood of this bramble, have been collected several species of plants rare or infrequent in the county and in the state. Among these were *Ophioglossum vulgatum*, *Eleocharis melanocarpa*, *Juncus Greenei*, *Polygala cruciata*, and *Solidago graminifolia* var. *remota*.

This blackberry grows on the swamp border fifteen rods south of the southeastern portion of West Lake, Kalamazoo County, Michigan. The following collections, *Hanes 1850*, have been deposited in the herbarium at the Bailey Hortorium: floricane in bud May 31, 1946; in flower June 8, 1946; in fruit together with primocane, July 24, 1946. Primocanes were collected again on October 14, 1946. At that time some of the primocanes were erect; others were arching with very slender ends which almost touched the ground. These might be expected to be free-rooting at the tips but examination of several score of canes showed this habit to be almost non-existent. Only one plant was seen that had taken root.

It has the largest number of clusters of flowers of any blackberry collected in Kalamazoo County. In the floricanes that were inclined to trail, the crowded fruiting clusters extended on the upper side of the cane for two to four feet whereas in those canes of an erect nature, the many branches spread in all directions. Of this specimen *no. 1850* L. H. Bailey in a letter of October 11, 1946 says, "I can make nothing of it and it must be a new one."

Note by L. H. B. This plant keys closely to *R. ablatus* of Missouri. It is apparently a larger bush than that species, much-branched, leaflets shorter and with less parallel sides and closer serratures, flower-bearing much more profuse, flowers small on long pedicels in more or less ascendate form.

Rubus senilis, spec. nov. Fig. 134.

Erectus, validus, ramosus, pæne 2 m. altus, griseo-pubescens, fortasse plus vel minus glandiferus in pedicellis et in axibus floralibus; primocani validi, sulcati, minute pubescentes, aculei lati basi, sparsi, 3–7 mm. longi: folia 5-foliolata, tenuiter pubescentia supra, molli-pubescentia subter; foliola 10–12 cm. longa, 4–7 cm. lata, elliptico-ovata, longo-acuminata, foliolum terminale oblique subcordatum, margines irregulariter serrato-dentati: floricani sulcati, retinentes aculeos et nonnullam pubescentiam; folia 3–5-foliolata, molli-pubescentia subter; foliola elliptica vel pæne ovata, 6–8 cm. longa, 5–6 cm. lata, breviter acuminata, margines grosse serrato-dentati: flores 6–10 in brevibus racemis cymiformibus circa folia æquantibus, pedicelli validi et tomentosi; corolla 2 cm. vel plus diam., petala separata obtusaque; lobi calycis pubescentes, breviter acuti: fructus pæne globulares, drupeolæ compactæ.

134. RUBUS SENILIS. Stout upright mostly glandless bush in high lands of western West Virginia, pubescent and gray as if old, strongly prickly.

Big gray-looking plant on uplands, apparently habitually glandless but sometimes lightly glandular on floral parts, flowers abundant in leafy clusters.

Erect, branching, stout, to nearly 2 m. tall, very leafy, heavily gray-pubescent, pedicels and floral axes perhaps more or less glandiferous but not habitually so; primocanes stout, deeply furrowed, minutely pubescent, prickles various and scattered, broad-based, 3–7 mm. long: leaves heavy, 5-foliolate, scantily pubescent on upper face, velvety on lower face; petiole long, stout, prickly, gray-pubescent; leaflets 10–12 cm. long, 4–7 cm. broad, terminal or central one broadly elliptic-ovate and obliquely subcordate at base, other leaflets narrower and mostly tapered to base, all margins irregularly coarsely but not sharply serrate-dentate, apex gradually acuminate: floricanes grooved or angled, retaining prickles and some of the pubescence; leaves 3–5-foliolate, thinly puberulent above, soft-pubescent underneath; leaflets elliptic to nearly ovate, 6–8 cm. long, 5–6 cm. broad, apex briefly acuminate, margins coarsely serrate-dentate: flowers 6–10 in broad short cymiform racemes little if at all exceeding the foliage, pedicels short, stout and gray-tomentose; corolla 2 cm. and more broad, petals well separated and obtuse; calyx-lobes briefly acute: fruit nearly globular, drupelets compact.

Western West Virginia: hills above Mercers Bottom, Mason County, *Bailey 350*, on hard dry land. It is a gray-looking plant, whence *senilis*, old.

In some respects like *R. Beadlei*, but leaflets much less long-acuminate, margins not acutely serrate and soft-pubescent underneath, inflorescence much shorter and more compact and lacking the long narrow leaflets and simple leaves of that species. The glandulosity, if any, of this species on pedicels and calyces, is difficult to determine when specimens are taken in a dusty area.

Rubus independens, spec. nov. Fig. 135.

Erectus ad 1 m. vel plus, eglandulosus, armatus, valde ramosus; primocani angulati, aculei basi lata, recti, 6–10 mm. longi: folia 3–5-foliolata, pæne glabra supra, subter molli-pubescentia, petiolus aculeatus; foliola ovata, longo-acuta, 7–10 cm. longa, 4–5 cm. lata, grosse et irregulariter serrato-dentata: folia floricanorum 3-foliolata, foliola varia, elliptica vel angustiora, 4–5 cm. vel minus longa, margines acute dentati: flores 6–10, spissi in brevibus ramulis lateralibus, pedicelli pilosi, 1–2 cm. longi; corolla circa 2 cm. diam., petala lata et obtusa; lobi calycis patuli, valde acuti sed non elongati.

Erect glandless much-branched bush with jagged leaves soft-pubescent underneath, flowers in short racemes leafy at base.

To 1 m. or more, erect, freely branched, glandless; primocanes angled, glabrous, prickles straight and very broad-based, 6–10 mm. long: leaves 3–5-foliolate, very nearly glabrous above, soft-pubescent underneath, petiole prickly; leaflets ovate and long-acute, 7–10 cm. long, 4–5 cm. broad, coarsely and acutely irregularly serrate-dentate: floricanes retaining the armature; leaves 3-foliolate; leaflets various in shape and size, elliptic or much narrower, some of them 4–5 cm. long, margins dentate to almost

135. RUBUS INDEPENDENS. Prickly erect glandless bush; primocane leaflets 3 or 5, long-ovate with nearly jagged margins; clusters racemiform, leafy at base. New York.

jagged: flowers 6–10, crowded on short lateral shoots, leafy at least at base, pedicels pilose and about 1 cm. long, or the lower ones in axils 2 cm. long; corolla about 2 cm. across, petals broad and very obtuse; calyx-lobes soon spreading, very acute but not elongated.

South-central New York: foot of Sullivan Hill, near entrance to State Park, Chemung County, *S. J. Smith 2615*, in sandy soil.

Perhaps to be keyed near *R. facetus*, but with much smaller flowers in less open and less leafy racemes, more uneven and almost jagged leaf-margins, leaves apparently more softly pubescent underneath.

Rubus bractealis, spec. nov. Fig. 136.

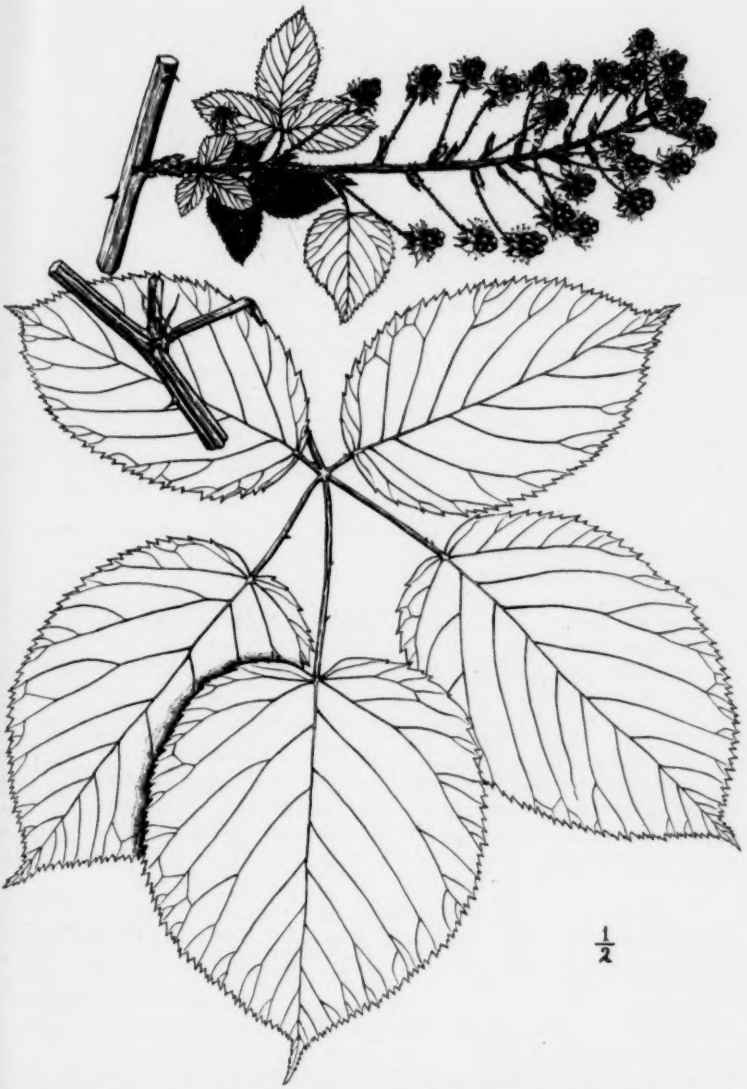
Erectus, vulgo recurvus, validus, eglandulosus, ad 1 m. altus; primocani angulati, aculei recti vel curvi 3–5 mm. longi: folia 5-foliolata, glabra supra, molli-pubescentia subter; foliola lato-ovata, abrupte acuta vel acuminata, plus vel minus cordata basi, 9–12 cm. longa, 5–8 cm. lata, acute serrata, petiolus sparse armatus: folia floricanorum 3-foliolata; foliola elliptica, ovalia, 3–5 cm. longa acutaque, foliola in inflorescentia interdum 2–3 cm. longa et sæpe fere obtusa: flores 9–20 in racemo regulari folia excedente, pedicelli divaricati et in axillis bractearum conspicuarum; corolla circa 2 cm. diam., petala obtusa et separata: fructus parvi, pæne globulares, drupeolæ paucæ.

Erect or arching, hairy-pubescent, glandless, with big soft leaves, flowers in racemes with conspicuous bracts at base of divaricate long pedicels.

Stout erect or upright plant to 1 m. or so, at length recurving; primocanes angled, bearing straight or slightly curved prickles 3–5 mm. long, glabrous: leaves mostly 5-foliolate, very nearly glabrous on upper side, soft-pubescent on lower side; leaflets broad-ovate, abruptly acuminate, more or less cordate at base, 9–12 cm. long, 5–8 cm. broad, closely acutely serrate, petiole sparsely armed: floricanes prickly; leaves 3-foliolate; leaflets elliptic, oval, those at base of inflorescence often 2–3 cm. long and sometimes mostly obtuse, those on branchlets 3–5 cm. long and acute: flowers 9–20 in a regular raceme that projects beyond the attached foliage, pedicels divaricate, terminal or central flower overtopped, each pedicel subtended by a bract about 1 cm. long (whence *bractealis*); corolla about 2 cm. across, petals obtuse and separated: fruit small, nearly globular, drupelets few; calyx-lobes soon reflexed, very narrow and acute.

Southern Wisconsin: Greenfield Park, Milwaukee County, *A. M. Fuller F-42-69* (type), growing on shoulder of embankment with *Vitis riparia*, *Ambrosia trifida*, Helianthus, in a tangled mass; near Madison, Dane County, *L. H. Shinners 377*, mixed with Corylus; Erin, Washington County, *Richard W. Pohl 997*; township of Lisbon, Waukesha County, *Pohl 98059*.

Relationship of this plant to *R. avipes* is yet to be worked out. That species extends as far west as Michigan, but I have not seen *R. bractealis* east of Lake Michigan. *R. bractealis* has its own character in the much



136. RUBUS BRACTEALIS. Upright bramble, glandless; primocane leaflets large and broad, abruptly pointed, some of them cordate; flowers in long racemiform clusters, bracts conspicuous. Wisconsin.

broader larger and less attenuate primocane leaflets, floral leaflets more obtuse, as well as in the prominent bracts from the axils of which the pedicels arise.

Rubus valentulus, spec. nov. Fig. 137.

Erectus, ad 2 m. altus, floricani arcuati, eglandulosi; axis primocanorum angulatus, armatus, aculei pæne recti, 3–4 mm. longi: folia 5-foliolata, glabra supra, molli-pubescentia subter, petiolus hamis armatus; foliola ovata vel elliptica, fere attenuata, 6–8 cm. longa, 3–5 cm. lata, grosse acute serrata, petioluli laterales valde breves: folia floricanorum 3-foliolata vel simplicia, foliola floralia 2–3 cm. longa: flores 3–4 in quaque axilla ramuli floralis in pedicellis aculeatis: fructus circa globulares, 1 cm. vel plus diam., succosi, dulces, drupeolæ magnæ; calyx reflexus, tenuiter pubescens, lobi brevi apice acuto.

Erect, floricanes sprawling, glandless, leaves soft-pubescent underneath, fruits few in an open broad cluster equalling or somewhat exceeding the leaves.

Stout well-armed plant, erect to 2 m. tall, floricanes lopping or partially decumbent, axis angled; prickles 2 cm. or more asunder, nearly or quite straight, 3–4 mm. long: leaves 5-foliolate, firm, glabrous on upper face, soft-pubescent on lower face, petiole armed with hooks, stipules small and very thin; leaflets ovate to elliptic, usually attenuate, 6–8 cm. long, 3–5 cm. broad, margins coarsely and acutely serrate or almost dentate, midrib on under surface of larger leaflets more or less armed, lateral petiolules very short: floricanes retaining armature; leaves 3-foliolate or simple in the inflorescence and the leaflets not often exceeding 2–3 cm. long: flowers usually 3–4 in each small cluster on side shoots, pedicels prickly: fruit nearly or quite globular, 1 cm. or more in diam., sweet, drupelets large and pulpy; calyx soon reflexed, scantily pubescent, point of lobes sharp and short.

Northeastern Texas: short distance north of Collinsville, Grayson County, *Rogers McVaugh 7117*, thicket along road in sandy-gravelly soil.

Appears to be related to *R. pensilvanicus*, but leaflets much more attenuate and more coarsely serrate, pedicels of fruit elongated and divaricating, floral leaflets broader, inflorescence apparently less evenly or regularly distributed.

Rubus humilior, spec. nov. Fig. 138.

Humilis, eglandulosus, parvus, 3–5 dm. altus; primocani teretes, multis rectis aculeis 2–3 mm. longis: folia 5-foliolata, parva, glabra supra, subter pubescentia, petiolus aciculatus; foliola 5–7 cm. longa, 3–4 cm. lata, ovata vel angusto-ovata, gradatim attenuata, basis vulgo angusta sed interdum subcordata, margines irregulariter stricte acute serrati: floricani teretes, aculei persistentes; folia 3-foliolata, similia foliis primocanorum sed minora: flores 6–8 in inflorescentia definita circa folia æquante, pedicelli sæpe bractiferi; corolla 2 cm. diam.; lobi calycis puberulenti angusto conspicuoque apice.

Low erect glandless branching little bush 3–5 dm. tall; primocanes

137. RUBUS VALENTULUS. Tall bramble in northeastern Texas, glandless, with acuminate primocane leaflets very acutely serrate-dentate, flowers few on prickly pedicels mostly surpassing the floral leaves.

terete, bearing many straight prickles 2–3 mm. long: leaves 5-foliolate, small, thin, glabrous on upper face, pubescent to soft-pubescent on lower face, petiole glabrous and aciculate; leaflets ovate to narrow-ovate, 5–7 cm. long, 3–4 cm. broad, narrow at base except the central one which may be subcordate, apex gradually attenuate, margins closely acutely irregularly serrate: floricanes terete, straight prickles still persisting; leaves 3-foliolate or 1-foliolate, like those of the primocanes unless smaller: flowers 2 cm. or less broad, 6–8 of them in a well-bracted cluster that little exceeds the leafage, pedicels spreading or ascending and often bractiferous; petals well separated and obtuse; calyx-lobes puberulent, with prominent short point.

Northwestern Pennsylvania: near Girard, Erie County, *Bailey 388* (type), *389*, in many dense colonies over an open field, bloom conspicuous.

Keys well with *R. pauxillus* but leaflets more attenuate and longer and acutely serrate, flowers more numerous in definite clusters not on a wand-like stem.

Rubus texanus, spec. nov. Fig. 139.

Rigidus, erectus, valde aculeatus, eglandulosus, coloniatus, 2 m. altus; primocani angulati, stricte pubescentes: folia 5-foliolata, glabra supra, molli-pubescenti-grisea subter, petiolus validus armatusque; foliola longo-elliptica vel pæne ovata sed vulgo latissima super medium, 7–9 cm. longa, 3–4 cm. lata, abrupte acuta, margines acute duplo-serrati: floricani ramosi, angulati; folia 3-foliolata; foliola in ramulis floralibus obovata vel cuneata, breviter acuta, 2–4 cm. longa: flores 2–10, in brevibus ramulis lateralibus, pedicelli valde breves: fructus brevi-oblongi vel pæne globulares, in compacto racemo, interdum 2 cm. longi et edules; calyx parvus, reflexus, lobi non elongati.

Erect stiff prickly glandless blackberry, with 5-foliolate ample leaves soft-pubescent underneath, the elliptic leaflets mostly broadest above the middle.

Large plant to 2 m. tall, very prickly and stiff; primocanes strongly angled, closely pubescent, with straight or slightly bent broad-based scattered prickles 5–7 mm. long, stipules very narrow, not long or conspicuous: leaves 5-foliolate, glabrous on upper face, softly gray-pubescent underneath, petiole stout and armed; leaflets long-elliptic to nearly ovate, most of them with a narrowed base because the broadest part is commonly above the middle, 7–9 cm. long, 3–4 cm. broad at widest part, margins variously acutely double-serrate: floricanes branched, often crooked and crabbed, axis angled; leaves 3-foliolate, those on the floral shoots very small; leaflets more or less obovate or cuneate, only briefly acute, 2–4 cm. long: flowers 2–10, on short pedicels on short lateral shoots or spurs: fruit in a close cluster or head, apparently mostly small and seedy but under good conditions nearly 2 cm. long, sweet and good; calyx reflexed closely under the fruit, lobes short.

Eastern Texas: known to me through collections by *Rogers McVaugh*, the numbers now cited: ten miles north of Paris, Lamar County, *7148*, low places in pasture; four miles east of Mineola, Wood County, *6769*, thickets in low grounds edge of woods; six and one-half miles north of

138. RUBUS HUMILIOR. Very low nearly glabrous glandless erect bushlet with open flower-clusters and ovate-pointed primocane leaflets. Northwestern Pennsylvania.

139. Rubus texanus. Very large prickly glandless blackberry of eastern Texas; primocane leaflets narrow, short-acute, mostly broadest above the middle; flowers commonly few in short lateral clusters.

Jasper, Jasper County, *6829*, edge of branch-swamp, leaning on shrubs; about three miles west of Orange, Orange County, *6870*, thickets along ditch in woods; two and one-half miles south of Arcola, Fort Bend County, *7016*, flat sandy woods among large oaks in dense shade; two miles east of Navasota, Grimes County, *7000*, *7001*, sandy roadside in low places; eleven and one-half miles northeast of Bastrop, Bastrop County, *6987*, thickets along road near bed of small stream (pedicels sometimes more than 1 cm. long and cluster loose); five miles west of Angleton, Brazoria County, *7021*, roadside bank in full sun on low ground.

To be compared perhaps with *R. Bushii* but distinguished at once by its greater size, canes heavily prickly, leaflets proportionately narrower and greatest width usually above the middle, flowers not in leafy clusters. *R. texanus* could be placed in the Cuneifolii without offense, because of its leaf shape, grayish (but not cinereous) pubescence on under surface of leaves, small simple condensed clusters.

Rubus polulus, spec. nov. Fig. 140.

Valde parvus gracilisque, 3 dm. altus, erectus, pæne sine aciculis, eglandulosus: folia primocanorum 3–5-foliolata, glabra; foliola ovata vel angusto-ovata, 4–5 cm. longa, 2–3 cm. lata, acuta, angusta basi, valde acute serrata: folia floricanorum 3-foliolata vel simplicia, foliola 1–3 cm. longa: flores 3–5, in pedicellis 1–2 cm. longis, in cymiformibus inflorescentiis; corolla circa 2 cm. diam., petala angusta separataque; lobi calycis angusti, reflexi, pubescentes, non prolongati.

Little plant, erect, not tip-rooting, nearly or quite nude, glandless, essentially glabrous, with flowers in small cymiform clusters.

Slender, upright or erect, nearly or quite simple except in flowering parts, glandless, about 3 dm. high, nude or with only traces of prickles, axis 2–3 mm. thick: primocane leaves mostly 3-foliolate, sometimes 5-foliolate, glabrous both surfaces, small; leaflets ovate to narrow-ovate, pointed or acuminate, 4–5 cm. long, 2–3 cm. broad, sharply and jaggedly serrate, narrowed to base, petiole nude or only minutely armed: floricane leaves mostly 3-foliolate or in some cases simple, the parts 1–3 cm. long: flowers 3–5 in little cyme-like clusters about equalling the leaves, pubescent pedicels 1–2 cm. long; corolla about 2 cm. across, petals narrow and separate; calyx parts very small, narrow, reflexed, pubescent.

Connecticut: railroad embankment near Noank, Groton, New London County, *K. P. Jansson 13* of 1933 (type); sandy field near Poquonnock Bridge, Groton, *Jansson 14* of 1933.

For several years these specimens have been assigned to one thing or another, and at last I make a separate name for them so that I can find them in the herbarium. I have tried unsuccessfuly to make them *R. perpauper* and to force them into *R. pauperrimus*, but the pictures show at once how different these three things are. It is the smallest of the Arguti I yet know (*polulus*, little).

140. Rubus polulus. Small glandless plant in Connecticut; primocane leaflets with sharply serrate edges and narrow apex; flowers few terminating the laterals and about equalling the floral leaves.

Latin-American Rubi

Two new Rubi from Latin America are now ready for publication. Other species from those regions were published by me in 1944 in Fascicle vi of Volume vi of Gentes Herbarum, with a brief introductory statement on the problem involved in the study of Rubus in American tropics and subtropics.

What we have now been able to accomplish for the brambles of North America should soon be undertaken for South America. That study should be one problem, quite independently of political divisions of the vast expanse. Apparently the Rubi of that territory belong in other sections of the genus than those in North America and probably the species are not as many. I have not seen good specimens of Rubus from tropical America (except a few collected by myself), and it is probably impossible ever to define all the species accurately in accordance with existing nomenclature. Practically all the evidences we have are little snips of floricane parts without primocanes or records of habit and dimensions or terrains. We do not even know whether all the species have a biennial alternation of canes. Yet if a good taxonomist had before him the original descriptions of known species and the herbarium collections of all the countries on loan he might be able to round up our present southern Rubus knowledge in a year or two of assiduous study, although some of the binomials might have to be eliminated as *nomina incerta*. Until then the naming of Latin-American Rubus is mostly guess-work.

Rubus breviglandifer, spec. nov. Fig. 141.

Erectus vel ascendens, 1–2 m. altus, aciculæ uncinatæ; axes dense brunneo-pubescentes brevibus pilis glandularibus: folia 3–5-foliolata, petiolus et petioluli dense pubescentes glandularesque; foliola 8–9 cm. longa, 4–5 cm. lata, oblonga, abrupte acuminata, latera parallela, molli-pubescentia subter, flocculento-pubescentia supra, tenuiter acuteque serrata: inflorescentia brevis, compacta, racemiformis, glandifera, 8–10-floribus, pedicelli 2 cm. vel minus longi et divaricati, bracteæ prominentes angustæque: fructus conici, circa 2 cm. longi, pulposi, drupeolæ multæ.

Erect shrub with brown-pubescent and closely short-glandular armed canes and oblong very closely serrate grumose-pubescent leaflets.

Bush 1–2 m. tall, upright but some of the branches vine-like, primocanes unknown but the succession probably more or less biennial; axes obtusely angled, closely covered with close irregular or bunchy brownish pubescence and short glandular hairs (whence *breviglandulifer*, shortly gland-bearing), prickles scattered and hooked: leaves 3–5-foliolate, terminal leaflet prominently stalked, petiole and petiolules hook-armed and closely pubescent and glandular; leaflets oblong or elliptic, abruptly short-pointed, 8–9 cm. long, 4–5 cm. broad, brownly soft-pubescent underneath, floccose-pubescent on upper face, margins very briefly and sharply thinly serrate: clusters

141. Rubus breviglandifer. Glandiferous bramble with narrow elliptic very closely serrate short-pointed floricane leaflets; clusters racemiform and compact, terminating leafy shoots. Honduras.

142. RUBUS HONDURENSIS. Large ascending shrub with vine-like branches, glandiferous; primocane leaflets very sharply serrate and acuminate; clusters terminal and paniculate, fruits small with few drupelets. Honduras.

terminal, short and close, little if at all exceeding the foliage, racemiform with continuing rachis; pedicels and axis closely tawny-pubescent and glandular, main pedicels 2 cm. or less long and divaricate, bearing prominent very narrow bracts: fruit 8–9 and 1 or 2 others in contiguous axils, conic or nearly so, pulpy, about 2 cm. long at full maturity, drupelets glabrous.

Honduras, Departamento Morazán, about 1,500 meters altitude, on hillsides in Quebrada Triguilapa near Hoya Grande: *Louis Williams & Antonio Molina R. 11966* (type); pine-oak forest area in same region, same collectors *11974*.

Rubus hondurensis, spec. nov. Fig. 142.

Ascendens ad 2 m., ramosus, axes hirsuto-pubescentes et pilis glandularibus et parvis aculeis uncinatis: folia vulgo 5-foliolata, molli-pubescentia subter, supra glabra; foliola ovata vel angusto-ovata, fastigata ad apicem, latera non parallela, 7–9 cm. longa, 3–4.5 cm. lata in medio, acute conspicueque serrata: panicula magna, terminalis, composita, flores et fructus 50 vel plures, ramuli pedicellique pubescentes glandularesque, bracteæ multæ angustæque: fructus parvi, paucis separatis magnisque drupeolis.

Upright shrub or the branches vine-like with ovate taper-pointed pubescent strongly sharply serrate leaflets and small fruits of few drupelets in compound terminal panicles, axes pubescent and slenderly glandular.

Ascending bush to 2 m., branching, axes thinly pubescent and bearing scattered slender glanded hairs and few small hooked prickles, some of the parts vine-like; primocanes thickly foliaged, succession probably biennial: leaves mostly 5-foliolate, petiole and petiolules hairy-pubescent and thinly glandular and with small hooked spines; leaflets ovate to long-ovate, gradually taper-pointed, uniformly soft-pubescent underneath, glabrous on upper face, 7–9 cm. long, 3–4.5 cm. broad at middle, margins conspicuously sharp-serrate: cluster a large terminal compound panicle-like assemblage probably overtopping the foliage, the flowers or fruits 50 or more, branchlets and pedicels hairy-pubescent and glandular, bracts many and narrow, calyces hairy-tomentose and more or less glandiferous: fruit small, of few separate drupelets.

Honduras, Departamento Morazán, in pine woods at Agua Amarilla about four kilometers west of Zamorano, altitude 1160 m., *Louis O. Williams & Antonio Molina R. 10455* (type); at Agua Amarilla, *Paul Shank 70*.

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